Appendix A -
Response to Comments

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Appendix A
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Appendix A - Response to Comments

A.1 Summary of Process

On Friday, February 8, 2013 the Notice of Availability for the Draft Environmental Impact Statement on the Revised Land and Resource Management Plan for the National Forests in Mississippi was published in the Federal Register (78 FR 9388) initiating a 90 day public comment period. The public comment period ended on Wednesday, May 8, 2013. The draft environmental impact statement and proposed plan were distributed for public comment and review. Six public meetings were held across the State of Mississippi, one near each Ranger District.

Delta National Forest, April 2, 2013

Holly Springs National Forest, April 4, 2013

Tombigbee National Forest, April 9, 2013

De Soto National Forest, De Soto Ranger District, April 11, 2013

Homochitto National Forest, April 16, 2013

Bienville National Forest Service, April 18, 2013

De Soto National Forest, Chickasawhay Ranger District, April 25, 2013

A content analysis team was commissioned to collect comments for input into a database utilized by the National Forests in Mississippi. The final environmental impact statement and revised plan were then prepared based upon the public comments received and further agency review.

Comment Analysis and Response Application (CARA) was the database utilized to record, review and respond to public comments received during the 90 day public comment period. CARA facilitated the process used to review, categorize, and respond to comments both individually and collectively.

This appendix documents the comments received during the 90 day comment period and our response to those comments. The original comment letters are presented in the format originally received and in the order they were received and entered into the CARA database. Each letter was assigned a numerical number and then the individual comments in each letter were identified and numbered sequentially by the CARA database. During our initial review of individual comments each comment was assigned to various categories to help facilitate grouping and addressing similar comments as a whole.

There are cross references to individual comments inserted in the text of the original comment letters. The comment number cross references are enclosed in [brackets] at the end of each comment (e.g., [Comment 3-1:]). Using these cross references, you can navigate to the individual comments and responses (beginning on page 49); where you can review the text of each numbered comment, followed by a table showing the categories assigned to the comment (e.g., Trails Management (152)), and the response to the comment. The category labels section (beginning on page 107) displays listings of the comment numbers assigned to each category e.g.:

Trails Management (152)

Comment	Comment
3-1:	7-1:

A.2 Original Comment Letters on Draft Revised Plan and DEIS

Eighteen individual comment letters were received during the 90 day public comment period on the draft environmental impact statement and proposed plan. The comment letters came in various forms, from e-mails to formal letters. Each comment letter is presented in this section in the original format as received.

Comment letters begin at number 3 because during setup of the Comment Analysis and Response Application (CARA) database the first two letters received in the data base were generated internally to ensure proper setup of the public comment database prior to the public comment period beginning.

The letters are listed as follows:

Letter Number 3:	Skipper Anding, Jackson Audubon Society
Letter Number 4:	Jean Public, anonymous public commenter
Letter Number 5:	Claude Jones, public commenter
Letter Number 6:	Ronisha Hodge, Community Planner, Columbus Air Force Base
Letter Number 7:	Eric Bray, public commenter
Letter Number 8:	Christine Leicht, Child Welfare Information Gateway
Letter Number 9:	Cary Norquist, USDI Fish and Wildlife Service, Mississippi Field Office
Letter Number 12:	Becky Stowe, Mississippi Chapter of the Nature Conservancy
Letter Number 13:	Glenn Hughes, Extension Forestry Professor, Mississippi State University
Letter Number 14:	Robert Smistik, public commenter
Letter Number 15:	Randy Miller, public commenter
Letter Number 16:	George Collins, Franklin County Board of Supervisors
Letter Number 17:	Charles Chapman, public commenter
Letter Number 18:	Steve Brewer, Professor, Department of Biology, University of Mississippi
Letter Number 19:	Heinz J. Mueller, Chief, NEPA Office Program, United States Environmental Protection Agency
Letter Number 20:	Frank Moore, Migratory Bird Research Group, University of Southern Mississippi

Letter Number 3:

Recreation

Cooperation with the Natchez Trace Parkway would be really wonderful. In Virginia the Blue Ridge Parkway, sister of the Natchez Trace, goes through 5 or more National Forests. This give the visitor a chance to enjoy the beauty of the forest with full measure. One can stop and walk away from the roadway at any point you choose and be away from the sounds of passing vehicles. Such an experience would greatly enhance the Parkway across the state of Mississippi and make it a true National Treasure like the Blue Ridge. Perhaps a land swap could help facilitate acquiring land along the Trace. [Comment 3-1:]

Old Growth

Old Growth Areas enhance the hiking experience with their scenic nature and support threatened ecosystems by preserving the diversity of plants and animals. They also help in water retention. [Comment 3-2:]

Forest Mix

Increased hardwoods makes an area more scenic and helps support a greater population and diversity of birds, etc. [Comment 3-3:]

Nature Trails and Lakes

Nature Trails and Lakes are very valuable to the public for recreation, enjoyment, and better knowledge of the outdoors. [Comment 3-4:]

Thank you for the opportunity to express our needs in the Forest Plan.

Skipper Anding

Jackson Audubon Society

Letter Number 4

i do not want a slash an d burn plan for these sites. i think you need to ban new roads and take out of use all roads that can be eliminated. too many roads. [Comment 4-1:] i ask for wilderness and wild and scenic river designations wherever possible. [Comment 4-2:] you need to be reminded this is national land, paid for by american taxpayers 325 million strong, and it does not only belong to local despoilers or profiteers who want some of it to maek money on. stop all burning because such burnin of vegetation creates dirty pollutd air. it isnt the smoke you have to worry about, its the fine particulate matter whch is microscopic. that gets picked up by the atmospthere and carried all the way to the east in america. many are sent to hospitals or die from the fine particulate matter which enters the body and causes pneumonia, allergies, asthma, strokes, heart attacks and LUNG CANCER. [Comment 4-3:]

WE OPPOSE LOGGING. WE OPPOSE TRAPPING AND HUNTER, THESE SITES WERE SAVED EXPRESSLY FOR WILDLIFE. [Comment 4-4:] SOMEHOE THE GUN WACKO PSYCHO MURDERERS SEEM TO HAVE TAKEN ALL THE LAND SAVED FOR WILDLIFE AND COME IN WITH THEIR LEAD SHOT WHICH IS TOTALLY DESTRUCTIVE AND THEY KILL AND THEY KILL AND THEY KILL. THERE IS SOMETHING WRONG WITH THEIR BRAINS WHEN YOU KILL AN INNOCENT ANIMAL THAT IS NOT HURTING ANYBODY. WHEN YOU JUST GO OUT TO THE WOODS TO KILL.

FORTUNATELY, WILDIFE WATCHERS FAR FAR OUTNUMBER THOSE PSYCNOT DEPRAVED GUN WACKOS AND THEY NEED TO HAVE PEACEFUL TIME TO USE THESE SITS, ALONG WITH HIKERS, BIKERS, PHOTOGRAPHERRS AND HORSE BACK RIDERS. [Comment 4-5:] THEY ARE PEACEFUL USERS OF THE PARK. THEY SPEND TEN TIMES THE MONEY THE CHEAP PSCYO WILDLIFE MURDERING HUNTERS S DO SO IT IS USEFUL TO MAKE SURE THEY HAVE MAJORITY OF TIME TO ALLOW THESE PEACEFUL VISITORS TO COME TO THESE SITES. THESES PEOPLE ARE IN TH EMAJORITY IN AMERICA. EVERY YEAR THE NUMBER OF WILDLIFE MURDERING HUNTERS GOES DOWN, SO THEY NEED LESS AREA TO KILL IN.

NO TOXIC CHEMICALS SHOULD BE USED IN ANY OF THESE SITES. IT RUNS INTO THE WATER AND POLLUTES THE WATER. WE WANT CLEAN UP PLEASE. [Comment 4-7:] THIS COMMENT IS FOR THE PUBILC RECORD. JEAN PUBLIC

Anon

Letter Number 5

Thank you for the detailed proposal for the management of the Mississippi National Forest. Many of us are very interested in the National Forest of Mississippi because we see it as the only opportunity to preserve the natural habitat of Mississippi in order that our children and grandchildren may experience what our forefathers who settled this region encountered when they arrived.

I have a few suggestions (recommendations) to enhance the plan presented. I will specifically address the Holly Springs National Forest and the Tombigbee National Forest because I am more familiar with these two entities.

There has been a long time proposal to Re-River the Little Tallahatchie River in the Holly Springs National Forest. The proposal is to breech the low-head dam at the Cypress Creek-Puscus Creek and the Tallahatchie Canal. The low-head dam turns the normal flow from the Cypress Creek and Puscus Creek into the Little Tallahatchie Canal to flow into Sardis Lake. The breeching of the low-head would turn the normal flow of the two creek into the old river run of the Little Tallahatchie River. The old river run meanders 22 miles down the bottom land hardwoods before empting into Graham Lake which is a part of Sardis Lake. The Channelized Tallahatchie Canal runs the same bottom but is only 13 miles in length. The old river run is primarily intact with only three known obstructions that could easily be dislodged with "ditching" Dynamite. The old river run and the proximity bottom-land hardwood are in pristine condition and would make an ideal scenic river for canoeing and hiking. There would be little initial expense and almost no maintenance cost. The Friends of the Upper Sardis Wildlife Management Area has proposed a detailed concept of the re-river of the Little Tallahatchie River. [Comment 5-1:]

I continue to be concerned with the cutting of old grow timber on the Holly Springs and Tombigbee National Forest. The soil is predominately sandy and the cutting of roads for hauling logs and the damage of logging skidders used to pull logs to bunching sites promote erosion and permanent washes and future gullies on the land. [Comment 5-2:]

Davis Lake in the Tombigbee National Forest has the potential to be a prominent campsite and bass fishing draw in all of Mississippi. The Davis Lake website on the National Forest Website is pathetic. It neither promotes the great fishing nor the quiet, serene setting of the campsite.

Puscus Lake in the Holly Springs National Forest has outstanding campsites, picnic areas, walking trails and good fishing. The problem is the lake has so silted it is only 3-5 feet deep in almost all the lake. The area is worth investment to improve the facilities. [Comment 5-3:]

Please feel free to contact me @ . I am Sec., Treasure of Friends of Upper Sardis WMA and have access to the plans to re-river the Little Tallahatchie. This is a worth while project and the cost is minimal. Friends of Upper Sardis WMA has secured some funding and also has the cooperation of the University of Mississippi Hydrology Lab to aid in the determination of the amount of flow needed to maintain floatable water in the old river run.

The changing of the water flow in the old river run and the canal will have no impact on the flooding or the Sardis Lake Level. The low head dam allows water into the old run when the water is high in the canal. The same water flows in one or the other. All the water flows to the same destination of Sardis Lake. [Comment 5-1:]

Thank you for the opportunity to respond.

Claude Jones

Letter Number 6

Comment from Columbus AFB located in Columbus, MS…

In the past Columbus AFB has received a call when projects such as these are in the vicinity of our Military Training Routes(MTRs). Columbus AFB will generally close our MTRs for that period of time, especially if there are helicopters flying in the vicinity. We ask that you continue this process. [Comment: 6-1] Please call 662-434-3011 or email 14oss.osop@columbus.af.mil, so we can have the appropriate timing to take the appropriate actions.

Thank You,

Ronisha Hodge | Community Planner 14 CES/CENPP

Letter Number 7

Interested in receiving any information on trail systems. [Comment 7-1:]

Eric Bray

Letter Number 8

Any of these updates should be forwarded to the NFCAD updates team headed up by [redacted] and [redacted]. I have cced them on this message so I'm sure whoever on the team has that State will make the update in the directory. [Comment 8-1:]

Thanks again!

Phyllis

Please open the attached document. It contains a copy of a Transmitted/Received Fax. :

Below is the contact information for State adoption and foster care officials contained in the *National Foster Care & Adoption Directory* for Colorado:

For each listing, please verify that the following information is correct:

- Basic contact information (agency's name, address, and phone and FAX numbers)
- Email address (**please provide email address** if one is missing and indicate any Statewide changes to the format of email addresses if applicable)
- Website address

Please return this document with changes to Child Welfare Information Gateway, National Foster Care and Adoption Updates, **nfcadupdates@childwelfare.gov** at your earliest convenience. ***Thank you again*** for your invaluable assistance!!

Letter Number 9

APR – 1 2013

MISSISSIPPI
DEPARTMENT OF WILDLIFE, FISHERIES, AND PARKS

Sam Polles, Ph.D.
Executive Director

March 26, 2013

National Forests in Mississippi
Proposed Forest Plan
P. O. Box 1919
Sacramento, CA 95812

To whom it may concern,

Please find the attached comments from the Mississippi Department of Wildlife, Fisheries, and Parks concerning the Draft Revised Land and Resource Management Plan for National Forests in Mississippi.

The Plan was reviewed by our staff from the Fisheries and Wildlife Bureaus as well as the staff at the Mississippi Museum of Natural Science. We appreciate the opportunity to make comment on a management plan that will influence wildlife habitat on Mississippi's National Forest lands.

Sincerely,

Sam Polles, Ph.D.
Executive Director
Mississippi Dept. of Wildlife, Fisheries, & Parks

1505 Eastover Drive • Jackson, Mississippi 39211-6374 • (601) 432-2400

Comments to the Draft Revised Land and Resource Management Plan for National Forests in Mississippi

Overall, this management plan is very good. Our primary concern is that this plan is far too ambitious to be realistic when one considers the state that the forests are currently in. The 10- year goals laid out in the Strategies are probably attainable, but even if accomplished, these practices would only be a small step towards accomplishing the Desired Conditions laid out in Chapter 2. In short, most of the Desired Conditions appear to be written to appease the reader rather than to actually guide the management of the forest. [Comment 9-21:]

Forest openings are mentioned in the plan at various points. Forest openings of greater than three acres in size on appropriate sites (e.g., dry ridge tops and areas with poor or thin soils) should be emphasized across all upland forest types to provide early successional habitat to game and non-game species. Supplemental food plantings should be deemphasized or abandoned all together.

General Comments in regard to Prescribed Bums on all habitat types requiring burns (Specifically 2.3.1, 2.3.6, 2.3.13, 2.3.14, 2.3.17, 2.3.18, 2.6.3, 3.2.1, and possibly others). The majority of USFS prescribed burns occur during the cool season (early months) rather than later, warmer months. Ecologically, these ecosystems would be better served with a significant portion of the burns occurring in the warm/hot season, which would more effectively control shrubs, invasive species, and non-adapted hardwoods. Several of these habitat types will likely be too wet to carry cool season bums (i.e. wet pine savannah, seepage bogs and flats, etc.). In addition, early season burns may cause problems with rare breeding and migrating amphibians, such as gopher frogs and Webster's salamanders (the latter of which is provided as an example of an uncommon species in multiple habitats within this document). Additionally, there needs to be some consideration for smaller-scale (<=100 acres) burns at least within the boundaries of Wildlife Management Areas. That could be something to take the cooperative MDWFP/USFS agreement a step further. These smaller burn units can reduce potential productivity limitation on some wildlife when large very blocks are burned at once. [Comment 9-22:]

1.1.2 Management Challenges, Page 3. We suggest including fragmentation of forest lands by new road construction and increased difficulty in conducting management activities, particularly fire, due to this fragmentation. These construction projects also often result in a loss of habitat for listed and SGCN species. [Comment 9-23:]

1.3 Plan Purpose, Page 5. We suggest adding, as an important factor in guiding management actions, the following purpose decision statement:

To incorporate state-of-the-art management practices designed to optimize habitat productivity for native wildlife in all silvicultural activities.

Given the laudable goal expressed on Page 7, Paragraph 5, Line 2 which states"...a focus on restoring and sustaining the native ecological communities…", the development and incorporation of the above statement as an additional management guide would be a significant addition assisting in realizing the concept of restoring and sustaining native ecological communities. [Comment 9-24:]

Chapter 2. Vision. The premise of this chapter is somewhat confusing. It is difficult to tell whether it is describing the "desired condition" or the current condition of the forest. For the purposes of this review, we assume the author is describing the "desired future condition". Perhaps if the verb tenses were not present tense it would be easier to discern. [Comment 9-25:]

The plan states "These desired conditions reflect the ecological, economic, and social attributes that we expect to exist on the National Forests in Mississippi in the future." This needs more explanation. Based on the Desired Conditions as they are written, it appears that the USFS plans to manage for an unnaturally high level of mature timber, which will likely spoil. In this case it appears the goals of ownership are dominated less by ecological and economic objectives and more by social and aesthetic objectives. There should be some discussion of this decision making process and exactly how the USFS arrived at the Desired Conditions so that the reader understands that the Forest Service: 1) is not simply making up numbers to appease the public and 2) does not believe that managing 60-80% of forests in mature timber is a sustainable condition over the long-term or ecologically and economically efficient [Comment 9-26:]

2.2 Forestwide Desired Conditions, Page 8. The document states that gopher tortoises are growing and thriving in restored habitats. Tortoises are doing exceptionally well in only a few areas within FS lands. Surveys indicate that most priority soils parcels do not harbor thriving gopher tortoise populations, but rather a decline in recruitment (as noted later in the management document). [Comment 9-27:]

2.3 Ecosystem Diversity, Page 12, Table 2. We suggest that this table be modified to reflect current ecological systems within each unit of the forest followed by desired conditions. Line 1 of Paragraph 2 on Page 12 indicates that "Table 2 displays the approximate current and desired percentage of each ecological system...", but it appears that the table only reflects draft plan "desired conditions." It is difficult to perform constructive review without existing conditions classified ecologically by unit of the system using the same classification criteria used for the presented desired conditions. We concur with utilizing a range of values but withhold specific comment on the appropriateness of specific management unit percentages until existing conditions, expressed as percentages, can be reviewed. The language provided addressing current conditions in sections 2.3.1 - 2.3.24 is rather general in nature and does not provide the needed specific information to complete constructive review of this extremely important table. [Comment 9-28:]

2.3.2 Shortleaf Pine-Oak Forest, Page 15. In paragraph 2, first sentence, Northern Bobwhite is misspelled northern bob-white. [Comment 9-29:]

The Desired Condition for these forest types consist of mature forest with less than 80% canopy closure, a sparse mid-story, and dense grasses and forbs in the understory. This condition is conducive to many species of wildlife, indeed. The burn rotation described may be adequate to maintain such a forest, but creating these conditions from the current forest conditions will be difficult to impossible. Current conditions of many of these forests have greater than 90% canopy closure with a dense mid-story of shade tolerant hickories and other saplings. If timber harvests are conducted to open the canopy, the shade-tolerant mid-story will be released.

Foresters should give some consideration to herbicide treatments where dense mid-stories exist prior to overstory manipulations. We recommend adding these intermediate steps. [Comment 9-30:]

2.3.6 Northern Dry Upland Hardwood Forest, Page 17. The stated desired condition for this forest is a closed canopy stand with a sparse mid-story and regenerating hardwoods. Certainly any regeneration in this condition would be shade tolerant and not indicative of the current overstory condition. We recommend giving better attention to future regeneration practices to promote a mixed oak-hardwood forest. [Comment 9-31:]

Additionally, sites within this forest type are suitable for restoration of upland oak savannahs consisting of more fire-tolerant hardwoods with an open and grassy understory. This type of forest

type was once prevalent in North Mississippi. Upland oak savannahs should be considered as a restoration goal on appropriate sites. [Comment 9-32:]

2.3.9 Southern Mesic Slope Forest, Page 19, Paragraph 1, Last Sentence. We concur with the general observation that fire intensity and frequency has played a role in increasing pine composition within this ecosystem beyond probable historic composition. In its purest form, this ecosystem is highly valuable to native wildlife. Degradation to this system, caused in part by fire, could possibly affect local wildlife habitat productivity. The specific strategies presented for this community on Page 50 addressing use of fire may need to be further restricted using parameters such as high fuel moisture levels before fires are introduced. [Comment 9-33:]

2.3.10 Northern Mesic Hardwood Forest, Page 19, Last Sentence. This sentence states "Abundance of this system generally falls within the mid- to upper-end of the desired range as depicted in Table 2." The absence of specific current conditions within the draft document makes it impossible to constructively address this statement. Based upon intimate staff knowledge of the existing condition of these systems within some units of the National Forest, revising this statement to a low-to-mid range may be more appropriate. Furthermore, it may be that fire intensity and frequency has also played a role in increasing pine composition within this community – certainly that has been the case in some localized areas and a similar statement to that suggested for the Southern Mesic Slope Forest may be appropriate. Once again, the specific management strategies for this ecosystem detailed on Page 51 may not go far enough to reverse this observed trend toward a greater pine component. [Comment 9-34:]

2.3.11 Desired Conditions for Floodplain Forest, Page 20, and 2.3.12 Lower Mississippi River Bottomland and Floodplain Forest, Page 21. Both systems are classified in their respective sections as having"...canopy closure in mature examples of this system being greater than 80 percent." If the intent of these sections entitled "Desired Conditions" in the draft plan is to describe the plan's long term objective for these ecosystems (not describing current conditions), we strongly advise revising the >80% to a range of values such as 70-75% as a desired condition. We refer you to the Lower Mississippi Valley Joint Venture (LMVJV) publication entitled Restoration, Management and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat which provides ample scientific evidence of the increasingly negative impact to native wildlife as forest canopy closure exceeds 80%. Such higher rates of canopy closure frequently result in reduced ground and midstory cover within the forest severely impacting stand diversity and, hence, wildlife habitat productivity (see comments provided later in our review on the same topic). Furthermore, high canopy closure rates (consistently >80%) across large forested tracts for long periods of time frequently result in stand midstories becoming dominated by shade tolerant shrubs and trees. This condition usually is undesirable from a silvicultural and wildlife habitat standpoint. When this condition occurs (and it usually does in these systems given long periods of time in a closed canopy condition), regeneration efforts are generally restricted to extensive use of clear cutting as the only tool available that has a possibility of success. Land managers are essentially relegated to use of this type of silvicultural technique because shade-tolerant species likely would capture any small hole within the canopy. We suggest that modifying stand closure to the recommended levels and implementing treatments/thinning as needed to maintain these levels across stand life will slowly begin to provide other less intensive regeneration opportunities and approaches such as group selection (<2 acre clear cuts) or shelterwoods (two stage regeneration removals). Either approach has distinct, long-term advantages to achieving ecological objectives and retaining stand-wide habitat values. [Comment 9-35:]

2.3.14 Xeric Sandhills, Page 22. This habitat type often does not contain the fuels to carry a cool season bum. We recommend growing season bums to control shrubbery and invasive hardwoods. [Comment 9-36:]

2.3.22 Ephemeral Ponds and Emergent Wetland, Page 27. We recommend seasonally appropriate bums for gopher frog basins, which are typically in the summer when the ponds are dry, and the gopher frogs have dispersed from the site. Additionally, cool season bums could pose negative impacts on this species. There are anecdotal incidences of gopher frog mortality due to inappropriately timed burning that coincided with gopher frog migrations. In addition, tiger salamanders are mentioned as a species found in this habitat, but we have no occurrences. [Comment 9-37:]

2.3.23 Cypress-dominated Wetlands, Page 27. These can also be found on the Desoto Ranger District. [Comment 9-38:]

2.4.1 Threatened and Endangered Species, Page 29. Should also include *Graptemys jlavimaculata* (Yellow-blotched map turtle)- Threatened. [Comment 9-39:]

The majority of gopher tortoise nest predation appears to be due to fire ants. Fire ants are much more abundant in under burned or cool season burned habitats where logs and limbs remain abundant on the ground. Metabolic bone disorder is often referred to as the disease issue with gopher tortoises on DNF lands. In Florida, it has been documented that calcium may be tied up in woody shrubs that would be better controlled with warm/hot season bums, such as gallberry, and unavailable to the plants eaten by gopher tortoises or invertebrates eaten by RCWs. [Comment 9-40:]

2.4.3 Management Indicator Species, Page 31. First, we have concerns with using longleaf pine community status (acreage) as a long term plan indicator "species." Certainly, there- establishment of this community to its former range on Forest Service ownership in Mississippi is a commendable goal entirely supported by the MDWFP. At face value, however, the simple exercise of measuring acreage change in longleaf community status does little to measure and track plant and animal diversity along with ecological changes associated with draft plan implementation. Stated another way, re-establishment of 'x' acres across a plan period to a particular community type in no way provides a measure of the ecological health and trends of the species dependent upon the community type. It tells the land manager nothing about what has achieved ecologically and what actions needs to be modified, continued, or abandoned to move toward described desired conditions for this community. We respectively request that you reconsider this selection and target using actual indicator species. [Comment 9-42:]

Second, the exclusive use of red-cockaded woodpecker (RCW) as an indicator species to measure ecological function and plant and animal diversity in pine forests leaves a lot to be desired. Even though it is clearly understood that RCWs must and should be a priority in pine communities, there is a large array of plant and animal species not dependent upon the target habitat conditions for optimum RCW habitat. We suggest consideration be given to utilizing at least one additional species as an indicator in these upland communities. [Comment 9-42:]

Finally, we strongly suggest adding additional species specific to the hardwood communities and recommend wood duck *(Aix sponsa),* fox squirrel *(Sciurus niger),* Swainson's warbler *(Limnothlypis swainsonni)* and red eyed vireo *(Vireo olivaceus).* The rationale and thought behind why these species are recommended can be provided if desired. The existing list of indicator species does nothing to track ecological health of the extremely important hardwood forest communities. [Comment 9-42:]

Furthermore, indicator species were selected "because population changes are believed to indicate the effects of management activities." Rather than selecting individual species, it might be more relevant

to look at guilds of species. For instance; it might be more relevant to look at grassland birds as a guild rather than the RCW as an individual animal. RCWs have a very specific niche. It is very likely that management practices, such as timber harvest and burning, may eliminate habitat for RCWs during the short-term, but will create habitat for these species along a successional gradient. This is impossible to quantify when looking at a single species, but if you look at the guild of similar species as a whole (i.e., pine-grassland obligates vs. shrub- scrub birds), it might be more useful. If indicator species are required or selected for use, we recommend using a grassland or open-forest grassland bird in addition to RCW that inhabits a wider geographic rang of the national forests in Mississippi (i.e., Northern Bobwhite, Bachman's Sparrow, etc.). [Comment 9-42:]

Largemouth bass *(Micropterus salmoides)* may indeed be a useful indicator for lentic systems on Forest Service property managed for recreational sport fishing. We cannot recommend largemouth bass as an adequate indicator for aquatic systems managed with biodiversity or natural ecosystem function in mind, especially for lotic systems. Largemouth bass are primarily lentic species that can adapt well to lotic environments and exhibits a broad and very adaptive diet. For these reasons, largemouth bass population trends could fail to indicate large shifts in the ecology of aquatic systems resulting from various practices. MDWFP's State Wildlife Action Plan (SWAP), formerly known as Comprehensive Wildlife Conservation Strategy (CWCS), provides a list of species (not all of which are considered rare) sensitive to many factors known to negatively impact biodiversity and natural ecosystem function (e.g., siltation, increased turbidity, increased nutrient loads, and altered hydrology). It is our recommendation that the Forest Service consult the MDWFP and/or the SWAP (CWCS) document to identify fishes that better serve as indicators of healthy biodiversity and natural ecosystem function relative to largemouth bass. The document in its current published form is available at: www.mdwfp.com/media/63792/cwcs.pdf. [Comment 9-42:]

2.7.1 Roads, Page 37. We recommend treating invasive species along USFS road corridors as soon as they are detected. [Comment 9-46:]

2.7.2 Trails, Page 38. See previous comment under Roads. [Comment 9-46:]

3.2.3 Loblolly Pine Forest, Page 46, Last Sentence. The last sentence states "Other communities such as upland hardwoods and mesic slope forests will also be converted from loblolly sites as well." We endorse this change or conversion but are troubled that the following page lists no target objective for this change by ecological system type and ranger district.

Please provide such a planning target in the objectives. In addition, the objectives for the loblolly pine forest state that all acreage (351,000) "…of this fire-dependent ecosystem have received a fire return interval of 1 to 4 years…." Successful conversion to upland hardwood/mesic slope mixed species hardwoods will likely, in some cases, require at least some modification in the normal bum regime proposed in both frequency and intensity. Reduced short-term bum frequency for 10- 20 years during and following conversion actions and long-

term modification to reduce bum intensity will be important to maintaining this hardwood community and selecting against greater pine component. Please see Page 19 of the draft plan and our comments on this subject above. It is doubtful that the upland mesic hardwood forest, in its purest form, can be classed as fire dependent, the classification given on Page 47 for the entire loblolly pine ecosystem. [Comment 9-47:]

2.9 Minerals Management, Page 42. We recommend including contingency measures for emergency spill situations. [Comment: 9-48]

3.2 Upland Longleaf Pine Forest and Woodland, Page 44-45. Key characteristics of upland longleaf were referenced including "abundance, fire regime, canopy structure, and tree age diversity"; however, the document did not emphasize the management regime to sustain canopy structure and tree age diversity, especially regarding role of regeneration strategy and management. [Comment 9-49:]

It is stated that of the acreage suitable for the longleaf pine ecosystem (251,000 ac), it is burned on a 1 - 4 year rotation with 40% of the bums conducted in the growing season. A combination of dormant season and growing season bums may be beneficial to manage longleaf pine and wildlife habitat. A patchwork of growing season bums can eliminate encroaching woody vegetation, and promote openings, grasses, and forbs, which support some wildlife associates. The current plan may want to consider including prescribed fire as one of the highest priorities of managing upland pine forests along with "restoration of longleaf pine" to achieve its restoration to a functioning "ecological system". Fire may be just as critical to restoration as establishment, since the two are usually not mutually exclusive of one another in natural history. [Comment 9-50:]

An understory restoration strategy may also be appropriate in developing the longleaf ecological system. We recommend specifying an understory vegetation monitoring and understory restoration strategy. Furthermore, we recommend including the identification and control of invasive species in this section of the plan. [Comment 9-51:]

3.2.5 Slash Pine Forest, Page 48, Last Sentence. The last sentence of this section states "... we have identified slash pine as a candidate for regeneration to shortleaf pine-oak or hardwood ecological systems...." As in the comment above, we suggest that target objectives for the conversion be provided in acres by ecological-system type and by ranger district. [Comment 9-57:]

It is stated that "maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system...", a statement that reflects either all aged management in even aged units, or an uneven aged management regime, which mimics the natural growth pattern of longleaf pine and can meet objective of providing wildlife habitat. Meeting objectives for timber and wildlife in longleaf pine stands may include thinning stands every 6 - 10 years with basal areas between 40 - 70 sq^2 per acre, depending on targeted wildlife species. [Comment 9-52:]

3.2.6 Northern Dry Upland Hardwood Forest, Page 48, Line 5,

3.2.7 Southern Dry Upland Hardwood Forest, Page 49, Line 8,

3.2.9 Southern Mesic Slope Forest, Page 50, Line 10,

3.2.10 Northern Mesic Hardwood Forest, Page 51, Line 10,

3.2.11 Floodplain Forest, Page 52, Lines 4-7,

3.2.12 Lower Mississippi River Bottomland and Floodplain Forest, Page 52, Line 5.

Repeated references are made throughout Section 3.2 to "closed canopy" hardwood forests as a positive stand attribute for wildlife habitat production. If the intent of this statement is to describe a forest stand where the canopy exists at a level that provides closure due to density (for example, canopy cover of the overstory consistently greater than 80 percent or basal areas consistently greater than 80 square feet), we strongly disagree that this condition is conducive to desired conditions for most species of native wildlife (game and nongame) that inhabit these systems. Briefly, a closed canopy severely limits sunlight penetration greatly restricting both quantity and quality of ground,

understory and midstory vegetation. Frequently, such stands exhibit open, park-like understory with little internal, horizontal or vertical diversity which severely limits wildlife habitat productivity for most all species. The science is very clear. Open, park-like conditions resulting from a uniformly closed overstory canopy severely restricts wildlife habitat productivity, including recruitment from nesting/foraging forest birds that utilize these canopy layers for their life cycle to utilization by game species such as deer and turkeys. Secondly, closed canopy hardwood forests tend to develop significant stocking of shade tolerant shrubs and trees which dominate the midstory. The shade tolerants can develop to the point that they immediately capture any gap which occurs, thereby significantly impacting future management options along with lowering species diversity. If the intent of this statement in these sections is a reference instead to a fully stocked stand (in comparison to low stocking rates associated with an RCW cluster site, for example), then please provide stocking rates intended and other canopy closure measures. Otherwise, it is suggested that such statements be deleted from the document as a desired condition of the hardwood forests in Mississippi. The draft plan stipulates that the Forest Service strategies for sustaining species diversity include providing ecological conditions that "support a diversity of native plant and animal species over the long term (Page 57, Paragraph 4). A uniformly closed-canopy forest is counterproductive to this objective and could negate achieving many of the long-term objectives. Also, see previous comment concerning this subject provided in item 5. [Comment 9-58:}

3.2.9 Southern Mesic Slope Forest, Page 50. A 1 to 6 year bum plan for Southern Mesic Slope Forest may be too frequent. A 6 to 20 year interval based on fuel conditions is more favorable. In addition, fire should not be pushed into the slope. [Comment 9-59:]

3.2.11 Floodplain Forest, Page 52, Line 8. Line 8 states "Natural processes will contribute significantly to attaining the desired conditions within this system...." Please explain what is meant by this statement. In the absence of unusually high stem mortality, unthinned, mature hardwood forests tend to develop closed-canopy, park-like conditions that typically provide relatively limited internal stand diversity. Consequently, these stands exhibit low-to-poor wildlife habitat values for most all species. Also, see previous comment on this subject. [Comment 9-60:]

3.2.11 Floodplain Forest, Page 52, Objective Bullet 3. The third objective bullet states "approximately 600 acres of floodplain forest have reduced overstory density and a species composition shifted toward desired characteristic species for this ecological system...." Please describe what constitutes these desired characteristic species for this ecosystem. [Comment 9-61:]

3.2.11 Floodplain Forest, Page 52, Objective Bullet 4. The fourth bullet objective states "Approximately 1,300 acres of the 97,000 total acres of floodplain forest are in the 0- to 10-year age class ... and approximately 88,000 acres are in mature forest condition (60 years or older)." These statistics indicate little, if any, planned thinning or stand silvicultural treatments other than 2-stage regeneration cuts (if we understand the intent correctly). If this is the planned management approach, we respectively submit that optimum wildlife habitat productivity will not be achieved on these forests other than minimum amounts of primary habitat on 1-2% of the ecosystem ownership. The math is simple-90% of the ecosystem in Forest Service ownership will exist as closed-canopy stands providing significantly lowered habitat productivity across the planning period. It is imperative that Forest Service staff consider intermediate thinning (contingent upon crown closure variables and multiple other stand attributes and agency objectives at that time, of course) across the life of the stand in order to create and maintain internal stand structure provided by multi-tier canopies and abundant ground cover. [Comment 9-62:] The draft plan repeatedly states objectives to support a diversity of native plant and animal species focusing on "restoring composition, structure and relative abundance" (Page 57). Without periodic disturbance (10-20 year intervals) associated with low-intensity thinning throughout the life of the stands, most areas will

offer little intrinsic habitat value for many native species. As stated previously, the science is clear. The Forest Service is referred, once again, to the LMVJV document which summarizes and provides adequate peer-reviewed reference material. The Forest Service in Mississippi has a unique opportunity in development of this new plan to incorporate current, state-of-the-art forest management approaches that will significantly enhance wildlife habitat productivity throughout the hardwood ecosystem in its ownership. We are suggesting consideration of approaches that will achieve these objectives. What is being suggested is not maximizing or skewing the draft plan to a wildlife habitat management plan. We fully understand that the Forest Service does not singularly manage for wildlife. The MDWFP, however, as the state's principle wildlife agency, has the responsibility to request that other public land managing agencies consider the best science and sound habitat management practices that optimize wildlife outputs from lands within state boundaries contingent upon agencies' mandates and policies. The above and similar comments are offered in that light. [Comment 9-63:]

3.2.12 Lower Mississippi River Bottomland and Floodplain Forest, Page 52, Line 5. This line states "Mature closed-canopy hardwood forests...." See previous comment. [Comment 9-63:]

Line 10. This line states, in part **"…**condition, and low intensity fires may be utilized to accomplish ecosystem objectives**…."** Please explain this statement. Other than use of fire as a site prep in a clearcut, controlling invasive species, or maintenance of a unique community, it is unclear what positive role fire would play in MAV hardwood ecosystem management. In contrast, it is very clear what negative impacts could occur if applied at stand-level scale. [Comment 9-64:]

3.2.12 Lower Mississippi River Bottomland and Floodplain Forest, Page 53, Objective Bullet 3. This bullet states "Approximately 6,500 acres...have improved species composition**…"** We assume this 6,500 acres across the plan's 15-year life (roughly 400 acres per year) reflects periodic management treatments/thinning for stand and habitat improvements. If the 6,500 acres reflect periodic treatments, we suggest this acreage be increased to about 15,000 acres across the plan's life expectancy (contingent upon individual stand conditions and other plan requirements, of course). We, once again, refer the Forest Service to the LMVJV document referenced above which enumerates ecologically-based, habitat-driven, sustainable management strategies for floodplain hardwoods reflecting many decades of highly-successful efforts across hundreds of thousands of acres of state- and federally-owned bottomland hardwood forestland. [Comment 9-65:]

3.3.4 Management Indicator Species, Page 62. See previous comment concerning indicator species. [Comment 9-42:]

3.7.1 Recreation, Page 75, First Line. The first line states that "Where appropriate, additional access for hunters by seasonally opening some routes on the National Forests in Mississippi will also be considered**…."** We encourage the Forest Service to continue to allow the off-road or off- trail use of OHVs by hunters to retrieve harvested deer and hogs on the 14 wildlife management areas on Forest Service lands in Mississippi. The off-road use of OHVs to retrieve harvested animals, such as deer and hogs, is necessary to encourage the harvest of these animals. The regulated harvest of deer provides the only effective means of controlling populations, ideally, at or below the carrying capacity of the forest habitat. The MDWFP's experience with managing public lands has demonstrated that hunters are significantly more likely to harvest deer if they can more easily transport the animal after harvest. Likewise, hunters are more apt to harvest hogs when motorized transportation is available for retrieval of these animals. For obvious reasons, the control or eradication of nuisance hogs should be a key objective to any management plan for Forest Service lands. Based upon our experience, off -road use of OHVs for retrieval of deer and hogs has not caused any adverse impacts to wildlife or other natural resources on wildlife management areas managed by the MDWFP because such retrieval is (1) low in frequency- only occasional to rare, (2) usually not concentrated to the same sites, (3) not

occurring during the time of year when most wildlife species are raising their young, and (4) used in a utilitarian manner that minimizes impacts to the resources. This type of use is minimally invasive compared to traditional, recreational uses of OHVs. [Comment 9-67:]

While we endorse the limited and infrequent off-road or off-trail use of OHVs for deer and hog retrieval by hunters, we recommend that all other OHV use be limited to designated gated roads or trails specified and developed for use by OHVs. The use of OHVs for outdoor recreation in this state has increased in popularity in the past decade. We recognize that the Forest Service tries to accommodate the request for recreational use of OHVs and balance that use with the obligation to protect and conserve wildlife resources. However, the general, unrestricted, off- road use of OHVs on Forest Service lands is not compatible with the best interests of the wildlife resources on those lands. Some of the problems inherent in allowing unrestricted, off-road use of OHVs include the following: (1) resource damage to sensitive soil types such as those susceptible to rutting in wetter, bottomland sites, (2) soil disturbance which could increase the levels of siltation into adjacent waterways and contribute to higher levels of turbidity, negatively affecting the biological health of aquatic systems, (3) damage to rare, threatened or endangered plant communities, (4) direct disturbance to wildlife and the accompanying noise pollution which can displace wildlife in certain circumstances, (5) use of OHVs to facilitate the illegal taking of wildlife, (6) difficulty of enforcing regulatory compliance and adherence to wildlife regulations because of motorized access, and (7) increased litter and dumping of potentially harmful debris. [Comment 9-68:]

4.2.1 Vegetation, Wildlife, and Fisheries, Page 81, Guideline 1, Line 5. Line 5 states that "Generally, hardwood regeneration harvests will not be made prior to age 90." We encourage the Forest Service staff to consider routinely incorporating group selection holes (tree removals < 2 acres) in all treatments/thinning where stand conditions permit the application of this less obstructive technique. Implementation of such an approach has proven highly successful in obtaining desired regeneration, including shade-intolerant red oaks, on many thousands of acres of public land across the MAV. Such approach also avoids the long-term, negative impacts associated with a larger clearcut area losing habitat productivity for long periods of time following canopy closure. [Comment 9-70:]

4.2.1 Vegetation, Wildlife, and Fisheries, Page 82, Guideline 3. See previous comments above. [Comment 9-70:]

4.2.1 Vegetation, Wildlife, and Fisheries, Page 83, Guideline 8. See previous comments above. [Comment 9-70:]

4**.2.1 Vegetation, Wildlife, and Fisheries, Page 83, Guideline 19.** When referencing planting wildlife food plots, we recommend emphasizing native vegetation management as opposed to, or in conjunction with planting food plots. Especially in the typical low quality soil of the longleaf forest, food plot plantings could be a big expense. Prescribed fire and disking has proven to promote native vegetation in the understory that is just as beneficial, or more so, than a food plot planting. Furthermore, large food plots may concentrate predators, which could be negative on some wildlife populations, such as northern bobwhite quail. Periodic thinnings, a carefully planned fire regime, and disking in the appropriate season to promote native grasses and forbs for cover and forage, have proven to be beneficial for wildlife. [Comment 9-71:]

4.2.1 Vegetation, Wildlife, and Fisheries, Page 83, Guideline 32. To insure that only certified triploid grass carp are stocked, all grass carp vendors should be asked if they participate in the USFWS Grass Carp Certification Program or if they obtain their grass carp from suppliers that participate in this program. Without the receiving receipt of a USFWS triploid grass carp certification statement for each grass carp shipment that the USFS receives, it cannot stated that only certified grass carp were

stocked. Many fish producers in Mississippi are selling triploid grass carp, but only one actually has USFWS triploid certification statements for the fish they sell. Fish eggs may be subjected to methods (pressure and temperature shock) that are known to induce triploidy but usually a percentage of such offspring (5-30%) are determined to be diploid through ploidy testing. [Comment 9-72:]

4.2.4 Fire, Page 88, Guideline 5. We suggest that alluvial sites of significant size (perhaps> 40 acres) be excluded, where possible, by modifying bum unit configurations except as noted in the last line of this item; or only included in bum units when fuel conditions will not permit intense fires. [Comment 9-73:]

4.2.5 Invasive Species, Page 89. Guidelines for Invasive Species practices should include cleaning tools and vehicles before and after use in natural areas.

We recommend including a section to address the impacts of wild hog damage to native wildlife habitats within National Forests. The impacts from wild hog damage on Mississippi's National Forests and consequently, some MDWFP WMAs, are of concern. There is opportunity for a cooperative plan between the USFS and the MDWFP to work collectively to reduce wild hog damage on National Forests that contain MDWFP WMAs. Regardless, the MDWFP suggests that wild hog impacts on wildlife habitats should be addressed within National Forests in Mississippi.

Wild hog populations continue to increase at alarming rates statewide. Wild hog populations are threatening native wildlife habitats, timber, agriculture, water quality, roads, and levees not only in Mississippi, but all across the United States. Wild hogs are not native to North America and are classified as a "nuisance animal" in Mississippi by state statute. Wild hog populations can naturally expand rapidly due to their prolific reproductive potential, adaptability to survive in virtually any type of habitat, and lack of natural predators. Populations have un-naturally expanded throughout the United States by illegal transportation and release into the wild by people who regard them for sport hunting more so than their potential to damage natural resources. Due to the severity of problems created by wild hog populations the MDWFP initiated wild hog trapping and removal efforts on all state-owned WMAs to reduce damage caused to wildlife habitats in 2012. [Comment 9-74:]

4.3.1 Ecosystem-based Management Areas, Page 94, Upland Longleaf Pine Forest and Woodland. It is stated that "three - four thinnings would occur throughout the life of the stand, with stand replacement around age 120" (page 94). The three- four thinning model is not the only option for longleaf pine. In fact, it may be beneficial to consider other models for management. Longleaf is well suited for uneven aged management, especially with the devotion to prescribed fire in longleaf stands. Two common methods to consider are the Stoddard-Nee! method, where up to 90% of the annual growth can be cut periodically, and the basal area- maximum dbh-q (BDq) method developed by the USFS. Regeneration is encouraged in the created openings, which can maintain a vigorous forest, and, with the proper fire regime, wildlife habitat for a number of game and nongame species.

5.3.1 Monitoring Questions and Performance Measures, Page 112, Table 12, B.3. The performance measures for the question "Are species diversity and game abundance supporting nature viewing and quality hunting opportunities?" are listed as Wildlife Census, Statewide game population estimates, and Visitor use monitoring. We recommend changing the three performance measurement. Completing a wildlife census on free-ranging wildlife populations is all but impossible. We recommend using Wildlife Surveys. Additionally, statewide game population estimates may not be indicative of game populations on National Forest lands, especially when there are no harvest estimates for these areas. We recommend site-specific estimates and monitoring implemented within each National Forest unit. Additionally, more detail is needed on the visitor use monitoring to determine "quality hunting opportunities". [Comment 9-75:]

Letter Number 10

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Richard B. Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303

ER 13/0082
9043.1

Jeff Long
Planning Team Leader
National Forests in Mississippi
200 South Lamar St., Suite 500-N
Jackson, MS 39201

Re: Comments on the Draft Environmental Impact Statement (DEIS) for US Forest Service (USFS), Revised Land and Resource Management Plan for the National Forests in Mississippi

Dear Mr. Long:

The Department of the Interior (Department) has reviewed the Draft Environmental Impact Statement (DEIS) for US Forest Service (USFS), Revised Land and Resource Management Plan for the National Forests in Mississippi.

We have no comments at this time. [Comment 10-1:]

If you have questions or need further information, I can be reached on (404) 331-4524 or via email at joyce_stanley@ios.doi.gov.

Sincerely,

Joyce Stanley, MPA
Regional Environmental Protection Specialist
cc:
Jerry Ziewitz – FWS
Gary Lecain - USGS
Anita Barnett – NPS
OEPC – WASH

Letter Number 11

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Mississippi Field Office
6578 Dogwood View Parkway, Suite A Jackson, Mississippi 39213

May 8, 2013

2013-CPA-87

Ms. Margrett Boley
USDA
National Forests of Mississippi
200 South Lamar, Suite 500-N Jackson, Mississippi 39201

Dear Ms. Boley:

The Fish and Wildlife Service (Service) has reviewed the Proposed Forest Plan and associated Draft Environmental Impact Statement for the National Forests of Mississippi. We offer the following comments in accordance with provisions of the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 4321 *et seq.),* and the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.).*

We commend your efforts to update the Forest Plan (Plan) which will guide management activities on the 1.2 million acres of national forest lands in Mississippi for the next 15 years. We appreciate the extensive collaboration that has gone into developing the Plan to date. We also strongly support the Plan's emphasis on native ecological systems and improving threatened and endangered species habitat, and its apparent reliance on adaptive management. However, while we are fully supportive of the vision of the National Forests of Mississippi as outlined in the Plan, in our review, we found it difficult to tie management of the Forests, over the next 15 years, directly to the status or conservation of endangered, threatened, or sensitive species. We also had trouble discerning a clear or defined adaptive management approach or model to relate their status to Forest Service activities. While more information on the status of endangered and threatened species is provided in the Draft Environmental Impact Statement (DEIS), as well some specific proposed actions in the alternatives (e.g., cooperative management units), overall, specifics on an adaptive management approach are absent.

We believe that this planning process provides a unique opportunity to: 1) ensure that many proposed or potential activities on Forest Service lands in Mississippi will not be likely to adversely affect federally listed species; 2) identify measures to mitigate for past and future actions that have, or will, adversely affect them; 3) improve the baseline status, and more importantly; 4) lead to the conservation (i.e., recovery) of the species on Forest Service lands. We believe that this can be done through developing a new Appendix for the Plan, and with only slight modification of the DEIS. Staff at the Mississippi Field Office is available to discuss and assist in this process, if you are interested in pursuing this.

Additional comments for your consideration:

General Comments

1. We support the restoration of the ecological function in the longleaf pine ecosystem and agree with restoring this system initially by transitioning to "high-function loblolly and slash pine phases". In many cases, thinning can be used, existing longleaf can be left in place, fire introduced, and ecological function can be achieved without the ground- and soil-disturbing effects of clear-cutting and re-planting. [Comment: 11-1]

2. We support the initiative to focus on inventory and restoration of ephemeral ponds and protection of stumps and stump holes. [Comment 11-2:]

3. Throughout the revised plan and associated documents, the common name of the Mississippi gopher frog needs to be changed to: dusky gopher frog and scientific name to: *Rana sevosa.* [Comment 11-3:]

4. Feral hogs have the potential to degrade habitat and destroy plant populations, such as those of the federally endangered Louisiana quillwort, and should be addressed in this Plan. [Comment 11-4:]

5. Forest Sensitive Species-We recommend that the Plan discuss non-federally listed rare species found in the National Forests of Mississippi such as the Camp Shelby Burrowing Crayfish or the Black Pine Snake. Again, staff in the Mississippi Field Office can assist in identifying these species of concern. [Comment 11-5:]

6. In April of2013, there was a confirmed sighting of the endangered Indiana Bat *(Myotis soda/is)* on the Holly Springs National Forest. We recommend the Plan be updated to include this new species. [Comment 11-6:]

Specific Comments

Comments on the Draft Revised Land and Resource Management Plan:

Section 2.3.1 Upland longleaf pine forest and woodland

1. p. 14: The "Desired Conditions for Upland Longleaf Pine Forests and Woodlands" includes the statement, "fire occurs at an interval of 1 to 3 years with approximately 40% of fires occurring in the growing season." However, on p. 45 under "Objectives for Upland Longleaf Pine Forests and Woodlands," there is the statement that "The estimated 251,000 acres of this fire-dependent ecosystem have received a prescribed bum return interval of 1 to 4 years, with approximately 40% of the burns conducted in the growing season for the first decade." We would like to see the Objectives match the Desired Conditions of burning every 1 to 3 years. [Comment 11-7:]

2. p. 14: In the box describing desired conditions for this forest type, fire frequency was described with 40% of fires occurring "in the growing season." For clarity, please define "growing season." [Comment 11-8:]

Section 2.4.1 Threatened and endangered species

3. p. 30, first paragraph: Dusky gopher frog populations may be stagnant to declining; however, you may want to mention the use of the newly restored pond (Pony Ranch Pond) as a new breeding site. In addition, I would say that the Mississippi sandhill crane population is slowly decreasing rather than increasing. [Comment 11-9:]

4. p. 30: The statement that "Louisiana quillwort populations are increasing and new populations are found regularly" needs to have some sort of documentation or citation to substantiate this claim. Also,

how is a determination made that a site is actually a new population and not a natural expansion of an existing population? [Comment 11-10:]

5. p. 30: The statement that "Pondberry appears to have stable populations, but they are not increasing" has no data or authorities cited to substantiate this claim. Our information indicates a decline in the USPS populations. [Comment 11-11:]

Section 3.3 Species Diversity

6. p. 58, first paragraph: Critical habitat was designated for the dusky gopher frog on June 12, 2012. This might be a good place in the revised plan to mention that critical habitat areas have been designated on the DeSoto National Forest (DNF). Shapefiles, clipped to just include the DNF areas, are attached. There are four areas within DNF that are designated critical habitat. These areas include habitat around the Glen's Pond and other associated ponds, habitat around Carr Bridge Road Pond, habitat around the Ashe Nursery ponds, and habitat around three ponds in the Mars Hill area of Perry County. One cooperative management unit has been created for the dusky gopher frog using a 2 km intersect with stands in the area of Glen's Pond. We do not have the shapefiles for this CMU, but based on our approximation, it appears it does not include the complete critical habitat unit around Glen's Pond. We would like to see CMUs for all of the areas designated as critical habitat; however, we understand that this may not be possible prior to finalizing the revised plan. [Comment 11-12:]

3.3.2 Mississippi Gopher Frog Cooperative Management Unit

7. p. 61, first paragraph under this section, second sentence: A memorandum of understanding (MOU) between the Forest Service, the Fish and Wildlife Service, and the Mississippi Department of Wildlife Fish (sic) (should be Fisheries) and Parks is mentioned as a guiding document in the management strategy for the frog on the DNF. However, we cannot find a signed MOU between these parties and do not believe such a document currently exists. [Comment 11-13:]

8. p. 61, first paragraph under this section, fourth sentence: In 2013, dusky gopher frogs bred at Pony Ranch Pond. These frogs are part of the Glen's Pond population, but this new site indicates the beginnings of the establishment of a metapopulation which was the intent of the management that has been on-going by the Forest Service on DNF. [Comment 11-14:]

9. p. 62, burn matrix, Table 5: At a gopher frog recovery meeting held in July of 2009, the burn matrix from 2008, as presented on this page, was updated. A pdf of this updated matrix is attached. [Comment 11-15:]

10. p. 85: There are specific recommendations for maintaining buffers around RCW colonies and black bear den sites. However, we could not find any conservation measures for activities near gopher tortoise burrows. The only mention was a blanket statement to "follow the habitat management strategies found in the most current USDI Fish and Wildlife Service Recovery Plan for each threatened and endangered species." We would like to see mention of the recommendation that a 25-foot buffer will be maintained around all known gopher tortoise burrows when utilizing heavy machinery. [Comment 11-16:]

Comments on the Draft Environmental Impact Statement:

3.5.3 Threatened and Endangered Species/Mississippi Gopher Frog

11. p. 71, Initial discussion under frog: This would be an appropriate place to have a more in depth description of the critical habitat designated on the DNF. [Comment 11-17:]

12. p. 72, Mississippi gopher frog responses to threats. Third paragraph, last sentence: Add "growing season" to sentence describing burning regime. Fourth paragraph: MOU is mentioned again. We are not aware of a signed MOU regarding dusky gopher frog management on the DNF. Fifth, sixth, and seventh paragraph: These paragraphs are duplicates of the first three paragraphs under the dusky gopher frog section. [Comment 11-18:]

13. p. 73, first paragraph: After second sentence, suggest adding something similar to this: "In 2013, a pond recently restored by the Forest Service and less than a mile from Glen's Pond was used as a breeding site." Also, a discussion of a management focus in the other 3 areas of critical habitat would fit here. [Comment 11-19:]

14. p. 73, Figure 10, CMU: The legend in this figure is not readable. The map in the figure would benefit from the addition of the CH units on the DNF. [Comment: 11-20]

15. p. 74, Mississippi Sandhill Crane Current Threats: Amend the third sentence and add an additional sentence to this paragraph as follows: "The wild flock has been slow to increase due to abnormally high mortality of nestlings and first-year birds. Population stability has been achieved only through the release of captive-bred chicks." [Comment 11-21:]

16. pp. 83-84, Pallid Sturgeon. Pallid sturgeon is no longer considered"...one of the rarest fish in North America." During the past decade, over 1,000 pallid sturgeon have been collected in the River, and telemetry studies find the species is utilizing numerous habitats along the river, above and below the mouth of the Yazoo. We can provide more information. [Comment 11-22:]

17. p. 233, under "Threatened and Endangered Species": The gopher tortoise is not listed as being associated with the species group "species dependent on fire to maintain habitat". A primary threat to the tortoise is habitat fragmentation/habitat modification, which often is the result of fire suppression. Fire is probably the most crucial element of maintaining quality tortoise habitat. [Comment 11-23:]

18. p. 234, Figure 77: Move this figure down the page so that it falls within the dusky gopher frog discussion. [Comment 11-24:]

19. p. 234, Section 4.5.1 Mississippi gopher frog effect and alternatives: The dusky gopher frog should be part of the "species dependent on fire to maintain habitat" group. Add group here, and add dusky gopher frog to appropriate table in Appendix G. [Comment 11-25:]

20. p. 235, Table 61: Update bum matrix to 2009 version, attached. [Comment 11-26:]

21. p. 235, second paragraph under this section, Last sentence, second word: Replace "banding" with "tagging". [Comment 11-27:]

22. p. 235, third paragraph under this section, second sentence: Replace "Mississippi Gopher Frog Group" with "Dusky Gopher Frog Recovery Team". [Comment 11-28:]

23. p. 236, Figure 78: Move figure down under discussion of Mississippi sandhill crane. [Comment 11-29:]

24. p. 236, section Mississippi gopher frog CMU alternatives and effects: This section is correct as Plan is currently written. However, if CMUs are added or modified, this paragraph will need to be amended. [Comment 11-30:]

25. p. 247, Section 4.5.9: Per Appendix G (Ecosystems and Species Diversity Report), Table G 71, (p. G-88), include "Species sensitive to hydrologic modification of wetlands" in the list of species group associations. [Comment 11-31:]

26. p. 276, Section Downed wood associates. first paragraph, last sentence: Last sentence seems incomplete. Stumps were removed in past, but need to present the current management practices. [Comment 11-32:]

27. pp. 276 and 277, Section Downed wood associates environmental effects: This section is duplicative of what appears under "Fire injury environmental effects." Also need to discuss downed wood effects. [Comment 11-33:]

28. p. 279, Section Species sensitive to fire injury environmental effects: This section is duplicative of that under downed wood discussion and appears to be a general discussion of forestry management. Suggest more focus on fire environmental effects. [Comment 11-34:]

APPENDIX G

29. p. G-9, Section Upland longleaf pine forest and woodland management strategy: It would be appropriate to discuss the specifics of what is meant by "growing season'' burning in this section. [Comment 11-35:]

30. p. G-61, Table G 42: Louisiana quillwort should not be listed as a pine flatwoods associate. The species occurs along low-order intermittent and perennial streams and their associated floodplain forests within Mississippi. [Comment 11-36:]

31. p. G-68, Table G 50: Louisiana quillwort should not be listed as a seeps, springs, and

seepage swamps associate. The species occurs along low-order intermittent and perennial streams and their associated floodplain forests within Mississippi. [Comment 11-36:]

32. pp. G-84-85, Table G69, Species dependent on fire to maintain habitat: Both the gopher tortoise and the dusky gopher frog are missing from this table and should be included. [Comment 11-37:]

33. p. G-84, Table G 69: Louisiana quillwort should not be listed as a species dependent on fire to maintain habitat. The species is dependent on periodic scouring floods to maintain its habitat. The species should be removed from this group. [Comment 11-38:]

34. pp. G102-103: The federally endangered *Isoetes louisianensis* (Louisiana quillwort) and *Lindera melissifolia* (pondberry) are species sensitive to canopy cover modifications and should be included here. Canopy modifications were cited as threats to these species in their listing documents and recovery plans. [Comment 11-39:]

35. p. G-151: Appendix G's Table G.7, "Threatened and endangered species removed from the National Forests in Mississippi list due to no known occurrence". Include an explanation why the species were removed from the list. For example, was the original locality information in error or was the species extirpated from the areas? [Comment 11-40:]

If you have questions, please contact David Felder at 601-321-1131, or for questions on certain species, contact one of the biologists below as appropriate:

Plants: Scott Wiggers, 601-364-6910
Invertebrates and Sturgeon: Paul Hartfield, 601-321-1125

Amphibians: Linda LaClaire, 601-321-1126
Reptiles: Matthew Hinderliter, 601-321-1132

We appreciate the opportunity to review and offer comments on the Proposed Forest Plan for the National Forests of Mississippi. We look forward to our continued collaboration with your office on the development of the Forest Plan.

Sincerely,

Stephen M. Ricks
Field Supervisor

JULY 2009 – RECOVERY MEETING Discussed changes to burn matrix

Goal is to reach target conditions without harming the MS Gopher Frog and move towards conducting growing season burning.

SUGGESTED BURN MATRIX Forest Service burn conditions** Use existing standards

TIMEFRAME	**CONDITION**	**BURN outside of drift fence**	**BURN inside fence and above area typically flooded during breeding season**	BURN inside of drift fence in area typically flooded during breeding season
BLOCKS A AND C				
ANYTIME	Adult Frogs in pond	NO	NO	**NO**
JANUARY - MARCH	Adult Frogs not in pond OR most (> 75%) frogs have left pond (>7 days since last movement at drift fence)	YES	YES	**NO**
APRIL - SEPTEMBER	Adult Frogs not in pond OR most (> 75%) frogs have left pond (>7 days since last movement at drift fence; could be either adults or metamorphs)	YES	YES	**YES**
MAY - JULY	Tadpoles are present in pond	NO	NO	**NO**
OCTOBER - DECEMBER	Adult Frogs not in pond	YES	YES	**NO**
BLOCKS B, D, & E				
ANYTIME	**No restrictions on burning**	**YES**	**----**	**----**

** Burn parameters to be defined by Forest Service

Letter Number 12

The Mississippi Chapter of The Nature Conservancy has reviewed the Proposed Forest Plan for the National Forests in Mississippi and has the following comments:

1. There is no mention of groundcover restoration/monitoring. Groundcover indicators provide a wealth of information regarding the measurement of conservation goals as they reveal management history and can be used at multiple scales. There are a suite of plant species that are less responsive to disturbance and a number of publications out there addressing this. We do understand these indicator species can vary between districts and even within districts. [Comment 12-1:]

2. Removing the gopher tortoise as a management indicator species: In Appendix F (Management Indicator Species), the justification for the removal of gopher tortoises as a management indicator species is that response to management takes a long time because they are a K-species. That is not necessarily true as gopher tortoises will start occupying younger stands of Longleaf pine forests as the ground cover conditions become favorable. Red cockaded woodpeckers require old growth longleaf pine stands and are not directly tied to groundcover as they rely on the insect species attracted to groundcover. Gopher tortoises feed directly on the groundcover and, in our opinion, are indeed indicators of management in terms of groundcover restoration goals at various restoration phases of Longleaf pine. [Comment 12-2:]

....a few supportive literature examples:

Kirkman, L.K. and R.J. Mitchell. 2006. Conservation management of Pinus palustris ecosystems from a landscape perspective. Applied Vegetation Science 9: 67-74.

Kirkman, L.K., K.L. Coffey, R.J. Mitchell and E.B. Moser. 2004. Ground Cover Recovery Patterns and Life-History Traits: Implications for Restoration Obstacles and Opportunities in a Species-Rich Savanna. Journal of Ecology 92: 409-421.

USFWS Gopher Tortoise Recovery Plan. (page 10, 2nd paragraph discusses gopher tortoise densities being highest in seedling/sapling stands. This is based on a unpublished data collected on the Conecuh Nat'l Forest)

Thank you for the opportunity to comment.

Becky Stowe

Terrestrial Program Manager

Letter Number 13

Dear Sirs:

Thank you for the opportunity to review and comment on the Proposed Forest Plan and associated Draft Environmental Impact Statement (DEIS) for the National Forests in Mississippi. As a forester, I am primarily interested in 1) how the National Forests will be managed long-term for the many benefits that we derive from these areas, and 2) how the National Forests can support the predominately rural counties in which they are located, as many counties struggle with high unemployment rates and economic challenges.

General comments:

- I support the Desired Alternative ("C") outlined in the DEIS. This seeks to restore natural forest ecosystems while increasing management above current levels. [Comment 13-1:]
- At the same time, I question whether significantly increased management can be accomplished in the face of budget and personnel restrictions alluded to in the Plan. [Comment 13-1:]
- I note that "81% of NF System in Mississippi is suitable for timber production." This is a reasonable balance that protects the many resources of our National Forests while allowing for a timber program that maintains forest health, aids local rural communities, and generates needed revenue for the US. [Comment 13-2:]
- Though beyond the scope of your request, and requiring Congressional changes, I would support a policy where a portion of the revenue generated from a District is returned to the District to support the many management activities required. [Comment 13-2:]

Specific comments:

- The product mix mentioned on page 140 of the Plan does not include pine poles. The DeSoto and Chickasawhay Districts in particular produce significant numbers of poles due to the large percentage of longleaf pine on these districts and access to pole markets. Pine poles have historically commanded a much better price than pine sawtimber, and this should be reflected in the analysis. [Comment 13-3:]
- Table 40 of the Plan (p. 162) presents an inventory of possible old-growth acreage, by district and community type, dated July 8, 2005. Less than 2 months later, Hurricane Katrina devastated forests in Mississippi, and the Plan acknowledged that the "DeSoto and Chickasawhay Ranger Districts took the brunt of Hurricane Katrina" (p. 170). As such, the acres presented for these Districts are suspect, particularly for the "River Floodplain Hardwood" type, as this type sustained greater damage than other forest types. I suggest a revision of the acres in the above 2 districts, as these numbers do not currently reflect the reality post-Katrina. [Comment 13-4:]
- According to the DEIS, the proposed alternative ("C") calls for harvesting 16% of net forest growth (or 25% based on the Oswalt et al., 1997 data). By the end of the 5th decade, according to the DEIS (p. 315), 82% of the forests will be in the 60+ age category. Such a high percentage in older age categories predisposes the trees to damage from a variety of factors including windstorms, ice storms, insects, diseases, and other mortality factors. A more balanced age class distribution would result in better forest health, without compromising amenity values we obtain from the forest. [Comment 13-5:]
- The cost/benefit analysis contained in the DEIS is suspect. Some data are "direct" impacts, and others likely contain "direct and indirect" impacts. Mixing these two data sources results in an incomplete and incomprehensible analysis. Further, no Discount Rate is given, and this is used in Net Present Value (NPV) calculations. Though I am not a forest economist, an independent review would help this section. [Comment 13-6:]

- Necessary activities such as invasive species control and prescribed fire are crucial to maintaining ecosystem health. In the future we will see greater challenges with invasive species, as well as challenges to our ability to use prescribed burning. [Comment 13-7:]
- The DEIS (p. 117) documents what can only be considered as wild fluctuations in the amount of timber harvested in Mississippi's National Forests over the past 20 years. This is not good for forest health or local communities. The Forest Service must have the ability to plan and conduct a timber harvest program that benefits forest health without compromising other important benefits from the forest. A stable program also benefits rural communities by providing jobs and income through forest health and restoration activities. [Comment 13-8:]
- I encourage the National Forests to identify specific opportunities where they can showcase forest management practices to both landowners and the interested public. Some of this already occurs, as the Chickasawhay Ranger District has the "Gavin Auto Tour" and "Managed and Unmanaged 40" demonstration areas. A specific recommendation is to implement demonstrations on how to convert from even-age to uneven-age management over time. I note on Table 14 of the Plan that there are no appreciable acres of uneven-age management proposed, and feel this is an opportunity to test such a system across Mississippi's National Forests. [Comment 13-9:]

I appreciate the significant time and effort required to develop the Plan. I encourage the Forest Service to revise as needed and implement this Plan as soon as is practical.

Sincerely,

Glenn Hughes

Letter Number 14

Here are my comments:

1. Need to consider adding Whiskey Creek Hills and Steve Hills as a special areas. Whiskey Creek Hills was originally considered for Wilderness Designation during RARE 1 Study. Need to reexamine Milky Creek area for special area designation also. Need to accelerate designations of existing proposed RNA's to designated through NEPA process. [Comment 14-1:]

2. Are heritage resources now being called cultural resources? [Comment: 14-2]

3. Revisit use of hydraulic fracturing for natural gas development in view of current controversy and new information regarding potential adverse effects on ground water. [Comment 14-3:]

4. Address silvicultural and economic soundness of restoring longleaf pine on Homochitto National Forest. Highly productive loblolly sites produce prolific natural seeding of loblolly defeating any attempts to restore longleaf regardless of herbicide use and prescribe burring. Focus on intensive thinning regimes to promote forest health here. [Comment 14-4:]

5. What happened to the featured species concept that was in the 1985 Plan? Typo in Table 63 (Southern). [Comment 14-5:]

6. Need to add Canadian thistle to list of non native invasive/noxious plants. [Comment: 14-6]

7. Are the standards and guides from 1985 Plan rolled over into this Plan? Are all 18 amendments to current planned rolled over into this proposed plan? [Comment 14-7:]

8. Since adequate funding and manpower is not available to do the necessary improvements for forest health, what direction will be given to the Districts to prioritize where and when compartments would be entered? I would like to see how the order of entry has changed from every compartment being entered every 10 years to what it will be in this proposed plan? [Comment 14-8:]

9. Need to accelerate resolution of claims and encroachments. Need to ensure all property lines are refurbished on regular maintenance schedule, including RNA and Wilderness boundaries. [Comment 14-9:]

10. Are all shortleaf stands to be regenerated to shortleaf on the DeSoto NF? Does longleaf restoration on these sites take priority? [Comment 14-10:]

11. Seems like the Forest Service could make an attempt to buy those mineral rights from the third party so those proposed wilderness areas inclusions can be designated wilderness on the Black Creek Wilderness. [Comment 14-11:]

12. Are there approved habitat management plans yet for gopher tortoise, gopher frog, rcw, and sandhill crane by the USFWS? [Comment: 14-12]

Robert Smistik

Letter Number 15

Re: Proposed Plan, Mississippi National Forests
Randy Miller

FEB 28 2013

Gentlemen,

I have had the opportunity to review the LRMP for the National Forests in Mississippi as outlined in your draft. After reviewing the draft and data, my choice for the proposed plan would be Alternative D, "an increased emphasis on restoration of historical forests".

Regardless of the final plan, below listed are my major concerns:

Old Growth strategy

Species Viability [help enhance red cockaded and Louisiana black bear habitats]

Recreational Management

Material Management [authorizes oil and gas leasing]

As I am a primary user of the Homochitto and DeSoto National Forests, I would agree that Alternative D is best for all Mississippi National Forests. [Comment 15-1:]

Respectfully,

Randy miller

Letter Number 16

FRANKLAN COUNTY BOARD OF SUPERVISORS
P. 0. Box 297 / 36 Main Street - Courthouse Square
Meadville, MS 39653
601-384-2330

May 3, 2013

National forests in Mississippi
Proposed Forest Plan
P. 0. Box 1919
Sacramento, CA 95812

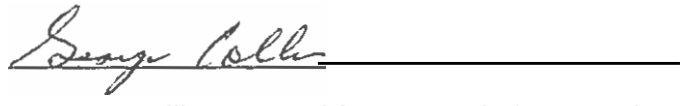
To Whom It May Concern:

Our local U. S. Forest Service personnel hosted a meeting on April 16, 2013, in which several county elected officials attended. We were notified of the comment period for the newly released Proposed Forest Plan for the Mississippi National Forests. By this letter, we are our voicing existing and ongoing comments and concerns related to the damages to county public roadways and infrastructure due to logging practices within the Homochitto National Forest. [Comment: 16-1]

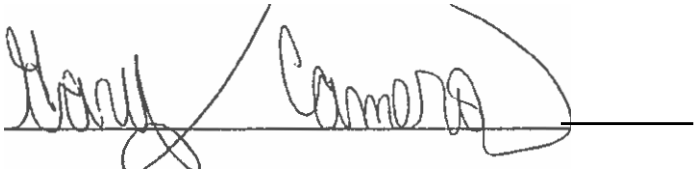
The draft EIS states that the USFS will be cutting 30% of the target in the Homochitto forest when it only encompasses 19% of the entire National Forest lands in Mississippi. We believe that the largest target area should be in the DeSoto/ Chickasawhay Districts where the Fish and Wildlife Service has declared these two districts as red-cockaded woodpecker recovery sites. [Comment 16-2:] The EIS has failed to identify the effects of the 30% target within the Homochitto National Forest. With the target area being approximately 39,000 acres, we do not need the aggressive timber cutting scheme that is planned for this area. [Comment 16-3:] The former plan shows the cutting in compartmental areas of approximately 1000 acres each which was to vary throughout the forest each year. The new directive has the units in 8,000 to10,000 acre areas which puts undue stress on our county's infrastructure including bridges, culverts, drainage areas and especially our roads since the cutting is in such consolidated areas. This, in turn, leads to burdens on the local tax payers in our small, rural county. We feel that the "old style" of timber management has worked well in the past and we are against the new EIS. [Comment 16-4:]

Please feel free to call us at the above number and we would welcome you to set up a time to meet with us at your earliest convenience to discuss these issues.

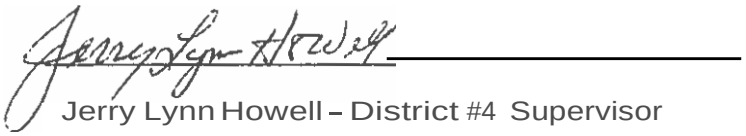
Sincerely,



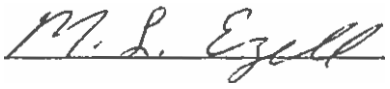
George Collins – President Board of Supervisors



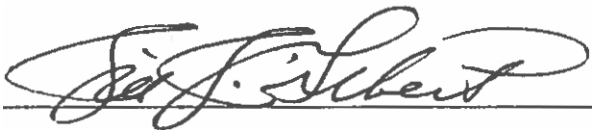
Gary Cameron – District #1 Supervisor



Jerry Lynn Howell – District #4 Supervisor



M. L. Ezell – District #5 Supervisor



Jill J. Gilbert, Chancery Clerk

Letter Number 17

May 3, 2013

National Forests in Mississippi
Proposed Forest Plan
P. 0. Box 1919
Sacramento, CA 95812

To Whom It May Concern:

Our local U. S. Forest Service personnel hosted a meeting on April 16, 2013, in which several county elected officials, as well as concerned citizens attended. We were notified of the comment period for the newly released Proposed Forest Plan for the Mississippi National Forests. By this letter, I am voicing my opinion concerning existing and ongoing comments and concerns related to the damages to county public roadways and infrastructure due to logging practices within the Homochitto National Forest. [Comment 17-1:]

The draft EIS states that the USFS will be cutting 30% of the target in the Homochitto Forest when it only encompasses 19% of the entire National Forest lands in Mississippi. I believe that the largest target area should be in the DeSoto/Chickasawhay Districts where the Fish and Wildlife Service has declared these two districts as red-cockaded woodpecker recovery sites. [Comment 17-1:] The EIS has failed to identify the effects of the 30% target within the Homochitto National Forest. [Comment: 17-2] With the target area being approximately 39,000 acres, I believe Franklin County does not need the aggressive timber cutting scheme that is planned for this area. [Comment 17-1:] The former plan shows the cutting in compartmental areas of approximately 1000 acres each which was to vary throughout the forest each year. The new directive has the units in 8,000 to 10,000 acre areas which puts undue stress on our county's infrastructure including bridges, culverts, drainage areas and especially our roads since the cutting is in such consolidated areas. This, in turn, leads to burdens on the local taxpayers in our small, rural county. I feel that the "old style" of timber management has worked well in the past and I am against the new EIS. [Comment 17-3:]

Sincerely,

Charles Chapman

Letter Number 18

Dear Ken (and others):

I've skimmed through most of the draft forest plan. I commend the writers on the hard work that went into this. I have no serious objections to most of it. However, I spent most of my time reviewing the recommendations for the upland communities in north Mississippi, and I feel obligated to raise some concerns. I've spent the past 15 years studying historical communities and have initiated ecological restoration projects in what is described here as Northern Dry Upland Hardwood Forest and Shortleaf Pine-Oak Forest and Woodland. I devote most of my comments to these ecosystems because I believe these are the most misunderstood and mismanaged ecosystems in Mississippi.

Part of the difficulty I have with the desired conditions of these ecosystems and the recommended management is the apparent insistence on using NatureServe to provide the reference descriptions for the ecosystems. I voiced this concern at the experts meetings in Jackson. I have no problem with NatureServe, per se, and the work it does, but in the drafting of this plan, there is a contradiction. The National Forests in Mississippi (NFM) claims to be interested in restoring approximate historical community structure and composition, but NatureServe describes and categorizes communities AS THEY OCCUR TODAY. As a result, the description of, say, the Northern Dry Upland Hardwood Forest, is a description of an ecosystem that has developed in response to fire exclusion in the 20th century. I don't think it is workable to try to have it both ways: i.e., to restore historic composition and fire regimes, but to use an artifact of modern fire suppression as your reference.

I have no objection to management aimed at achieving the desired conditions of the Northern Dry Upland Forest, as long as there is a stated recognition that the NFM is choosing to make this ecosystem an exception to the general rule that the restoration of historic fire regimes and associated community structure and composition is the desired objective of management. In other words, the NFM should state that it sees value in restoring the historic fire regimes and associated community structure and composition to longleaf pine ecosystems, shortleaf pine-oak woodlands, prairies, and wet savannas and perhaps other fire-dependent ecosystems, but not to Northern Dry Upland Forest. It should then state what the values of fire restoration are and then clearly explain why an exception is being made for Northern Dry Upland Forest. I anticipate that some will respond to my criticisms by saying that the NFM is interested in restoring fire to these ecosystems. My response is that, unless an appropriate and historically relevant fire regime is included in a comprehensive plan to restore Upland Open Oak Woodlands (notice I said Open Woodlands, not Forests), implementing frequent fire will not be an effective ecosystem restoration tool and could do more harm than good. For example, in the description of desired conditions of Northern Dry Upland Forest, no thought seems to have been given to the possibility that some of those species that apparently *require* closed-canopy conditions (conditions that developed under prolonged fire suppression) may not be able to tolerate the proposed prescribed burning frequency. I suspect that these species either can tolerate frequent fire and don't *require* closed canopies or they require closed canopies and cannot tolerate frequent fire. If the latter is true, then the NFM needs to consider the possibility that these species have benefited from fire exclusion and were not common components of upland ecosystems in north Mississippi historically, prior to fire exclusion in the 20th century. It also needs to consider which species might be losing out because of the NFM's refusal to restore open woodlands in these areas (e.g., Northern Bobwhite, Red-headed Woodpecker). I don't mean to say that the desired conditions of Northern Dry Upland Forests should not be one management goal. I'm just arguing that restoration of open oak woodlands in areas currently dominated by dry and midslope upland hardwood forest should be an additional and alternative management goal. The desired conditions should include more open canopies and a more productive and diverse groundcover vegetation of greater value to declining or near-threatened wildlife species of concern such as Northern Bobwhite and Red-headed Woodpecker.

My comments on specific passages follow:

Northern Dry Upland Hardwood Forest Desired Ecological Condition

Overstories are typically dominated by upland oaks (post, southern red, blackjack, and white)

Why not black oak? It was far more common historically in dry uplands than was white oak. Scarlet oak was also common. [Comment: 18-15]

In the NE portion of the Holly Springs District, there is also a unique upland assemblage dominated by rock chestnut oak with midstory dominated by sourwood.

and hickories (mockernut and sand). Often loblolly

In north Mississippi, there is little or no convincing evidence that loblolly pine was common in dry upland "hardwood" forests historically. I would like to see a citation for this. Hilgard (1860) makes no mention of loblolly being in dry upland areas in north Mississippi.

and shortleaf pines are intermingled with hardwoods. Midstories are sparse and typically dominated by dogwood, persimmon, and other hardwoods. Understories are also sparse and dominated by seedling hardwoods, shrubs and forbs.

Historically, this was not true of the dry upland woodlands. They contained a relatively productive and diverse groundcover of late-season grasses (Schizachyrium scoparium, Chasmanthium sessiliflorum), panic grasses, perennial sunflowers, and legumes (primarily Lespedeza and Desmodium). See before and after restoration photo at Strawberry Plains.

This system supports populations of associated rare species, including the worm-eating warbler and the yellow lady's slipper. Where suitable site conditions exist, several rare habitats are typically imbedded within this larger system including rock outcrops, seeps, springs, and depression pondshores.

Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forests may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-5 acres. Regenerating forests (0-10 years old) comprise no more than 7 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 70 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent.

Is this the desired canopy closure? If so, why? Contrary to what is being suggested here, fire-maintained open oak woodlands (with canopy coverage of 50 to 80%) were MUCH more common historically in this landscape than were the dry upland hardwood forests described here. In fact, most of the dry upland forests described here are artifacts of fire suppression. That should be made clear, in my opinion, namely that NFM desires to prolong the legacy of fire exclusion in this system (presumably to benefit species such as Worm-eating Warbler). If it is in fact true that Worm-eating Warblers require closed canopy upland forests, then I would like to remind folks that Northern Bobwhite and Red-headed Woodpecker require more open canopies and are associated with oak woodlands and savannas. They have IUCN listings as "Near Threatened." WEW's IUCN listing is "Least Concern."

Low intensity fire creeps into this system from the surrounding upland community and occurs on an average return interval of 1-6 years.

Which "surrounding uplands" are being referred to here? Many dry upland forests will be located on ridges.

Oak Woodland Restoration at Strawberry Plains Audubon Center

Photo: S. Brewer

Pre-treatment - July 2003 July 2010

Northern Dry Upland Hardwood Forest Management Strategy

Forest strategies for restoring, maintaining, and enhancing the northern dry upland hardwood forests should emphasize restoring the appropriate fire regime

In my opinion, priority (or at least consideration) should be given to restoring open oak woodlands in those areas currently designated as Northern Dry Upland Forests. The appropriate fire regime in my opinion is the same as for the Shortleaf Pine-Oak Woodlands, not low-intensity fires as mentioned above.

and using thinnings, gap creation, and irregular even-aged regeneration activities. Return of relative abundance to approach historical levels is a longterm goal for upland hardwood forests on the National Forests in Mississippi, [Comment 18-16:]

What does this mean? Are you talking about converting pine plantations to upland forests or are you talking about restoring upland forests that have experienced prolonged fire suppression to fire-maintained open woodlands? If the latter, then I think it is an opportunity missed. The decision not to restore open oak woodlands in north Mississippi is at odds with what I've seen happening at the state level in Arkansas, Tennessee, southern Missouri, Kentucky, and southern Illinois (and even in Mississippi, in regard to what John Gruchy with MS DWFP is doing).

but not one that will be immediately implemented given current program levels and competing needs.

What are the competing needs? Why not explicitly state these?

Tools such as stewardship programs and collaboration with partners offer opportunities to foster upland hardwood forest and woodland restoration.

Desired Conditions for Northern Mesic Hardwood Forest

Can someone tell me where these communities exist in northern Mississippi in Holly Springs National Forest? I have seen them on steep loess bluffs near Grenada and Enid Lake and in the Fall Line Hills in Tishomingo County (both fire protected), but I have not seen them in Holly Springs National Forest. Historically, in the loess plains (not to be confused with loess bluffs) and in the Eocene sandy-loam coastal plain areas that comprise most of HSNF, fire-tolerant oaks and shortleaf pines and to some extent hickories dominated the landscape all the way down to stream bottoms. Yellow poplar and beech were more or less non-existent. The Eocene sandy slopes and lower slopes are also where American Chestnut most commonly occurred in this region. I assume that its restoration is not under consideration.

Overstories are typically dominated by hardwoods, such as beech, white oak, cherry-bark oak, and southern magnolia.

If by southern magnolia you mean Magnolia grandiflora, I should point out that this species is not native to northern Mississippi. In fact, it is invasive in Bailey Woods in Oxford.

Mixed loblolly pine-hardwood conditions may exist within this system in the southern portion of the range. Subcanopies are more or less open and typically contain magnolia, hornbeam, yellow poplar, red maple, and flowering dogwood. Shrubs include red buckeye, switch cane, witch hazel, and deciduous holly. The forest floor typically has a rich organic layer with abundant leaf litter. This system supports populations of associated uncommon species, including Webster's salamander, American ginseng, and Turk's-cap lily. Several rare communities are typically embedded within this larger system including rock outcrops, seeps, and springs. Where site conditions are appropriate, these communities are present and functioning within this larger system. This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth

Old growth? Where?

is present. Early-seral components exist in sufficient quantities to sustain this system over time. Forests are typically closed, with canopy closure in mature examples of this system being greater than 80 percent. Low-intensity fire creeps into this system from the surrounding upland community and occurs at an interval of 1 to 6 years.

Desired Conditions for Shortleaf Pine-Oak Forest and Woodland

Overstories are typically dominated by shortleaf pine with a mixture of upland hardwoods

Historically, prior to fire exclusion, these "hardwoods" would have mostly been oaks, with perhaps some sand hickory. They were the same species of oaks as dominated the upland hardwoods communities in north Mississippi, the most common being black jack, but also including lots of black oak, post oak, southern red oak, and scarlet oak. Unlike today, white oak was a relatively minor component and was more common in hollows and near seeps, springs, and intermittent streams.

and other yellow pines. Midstories of oaks, hickories, sweetgum, yellow poplar, maples, and blackgum are sparse. Understories are dominated by dense growth of grasses and forbs. This system supports populations of associated species, including Bachman's sparrow and the northern bob-white. Several rare communities are typically embedded within this larger system including rock outcrops; seeps, springs, and seepage swamps, and ephemeral ponds and emergent wetlands. Where site conditions are appropriate,

these communities are present and functioning within the larger system. This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Forests and woodlands are open to very open, with canopy closure in mature examples of this system being less than 80 percent. Fire occurs at an interval of 1 to 3 years with approximately 40 percent of fires occurring in the growing season.

Perhaps need to define growing season.

From: Board_of_Directors_MSEPPC <klgordon@fs.fed.us>

Date: Tue, 5 Feb 2013 17:11:03 +0000

To: Pyro Maniac < @olemiss.edu>

Subject: RE: Link to Draft MS revised LRMP and EIS

Steve,

Thank you for your comments. I appreciate the time it took for you to do this. One comment that I would make is that HSNF and TNF are both in North MS and HSNF is less known (to many) and some of the generalizations you cite may be influenced by the better known? TNF. Your points are well made and, I think, can be incorporated a revised document. As we get further into the process, I may be back in touch to compare our fixes to your thoughts.

From: Steve Brewer [mailto: @olemiss.edu]

Sent: Tuesday, February 05, 2013 12:05 PM

To: Gordon, Kenneth L -FS

Subject: Re: Link to Draft MS revised LRMP and EIS

Ken,

Thanks for your reply and comments. I admit that I was mainly thinking of HSNF. I am aware that some of the upland hardwood forests in Tombigbee occur on more calcareous substrates and thus could have a more mesophytic character. However, my reading of Hilgard indicates that most upland communities that were not prairies in and around present-day TNF were either open oak woodlands or open pine oak woodlands (where pines were mostly shortleaf and maybe some loblolly). If historical conditions are being used a benchmark for management and restoration, then I think that it is reasonable to assume that closed-canopy conditions in upland areas (with the exception of steep ravines and bluffs) were the exception rather than the rule, even in TNF. Again, I'm not saying that Northern Dry Upland Forests should not be a management goal, just that we should be aware of the historical conditions and take those into account when defining desired conditions.

Best,

Steve

J. Stephen Brewer
Professor
Department of Biology

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From: Board_of_Directors_MSEPPC <klgordon@fs.fed.us>

Date: Tue, 5 Feb 2013 21:04:17 +0000

To: Pyro Maniac <@olemiss.edu>

Subject: RE: Link to Draft MS revised LRMP and EIS

I went back and downloaded the current version of NatureServe's description of the Northern Dry Upland Hardwood Forest. I am struck by how often the lack of knowledge is mentioned. Maybe there should be a general statement for ALL natural communities that species descriptions, etc are the best available and they often describe present conditions more than historic. But what historic condition? Ice-age? Before European settlement? How far back can your tree data push back time? What time frame is your description accurate? Our problem was that we needed a classification system that would cover ALL of Mississippi. NatureServe's classification while not perfect came the closest to meeting that need. Your work on HNF is not replicated elsewhere in the state (to my knowledge). Confusing and challenging!

Again, thanks for your input.

From: Steve Brewer [mailto:@olemiss.edu]

Sent: Wednesday, February 06, 2013 8:13 AM

To: Gordon, Kenneth L -FS

Subject: Re: Link to Draft MS revised LRMP and EIS

Ken,

I don't want to take up much more of your time, but I would like to respond. The very same questions you ask could be asked of longleaf pine ecosystems. Why are open, fire-maintained savannas or woodlands better than thickets choked with yaupon and hardwoods? Is restoring an approximation of what Harper saw in the early 1900s adequate? Why not an earlier benchmark? No one is asking these questions of longleaf systems because we in Mississippi have experienced some success in using fire and thinning off-site species to achieve positive results with regard to preserving biodiversity, including T&E and rare species, in longleaf systems. We've not concerned ourselves with the precise date of the benchmark for restoration, have we?

I am asking that the same consideration be given to upland hardwood communities in northern Mississippi. People in the Midwest are ahead of us on this issue because they don't have a lot of upland pine or bottomland hardwoods and therefore are not caught up in this false dichotomy of pines need fire, but hardwoods don't (need much). They speak of their oak woodlands and savannas more or less the same way we talk about longleaf pine. In fact, NatureServe does have descriptions for oak woodlands and savannas. It's just that it has not recognized them as being appropriate references for northern Mississippi. Nobody does. That is because fire exclusion has been so complete that there are essentially no open oak

woodlands left in Mississippi. As far as I know, I am about the only person who has bothered to investigate this.

Ultimately, I hope we all can agree that desired conditions should be based at least in part on what will best preserve biodiversity. My experience with the restoration projects at Strawberry Plains Audubon Center and at the Tallahatchie Experimental Forest is that there is a significant net benefit in terms of plant diversity to reducing off-site tree species and implementing fire regimes comparable to those used in longleaf pine ecosystems and oak savannas. Studies in similar habitats in adjoining states have shown similar responses, not just for plants but also for small mammals, birds, most arthropods, and reptiles. I honestly don't care whether this is considered natural or "correct" historically. The results in terms of biodiversity responses speak for themselves. These upland hardwood communities are not filled with trilliums and NEVER will be. Rather, they have a lot of suppressed and non-flowering helianthuses and coreopses and seed banks of lespedezas and other open woodland indicators, presumably waiting for the canopy to be opened up and to be burned. The few shade-tolerant mesophytic herbs that are present (e.g., green dragon, christmas fern, false solomon's seal) have responded POSITIVELY (or at least not negatively) to opening the canopy and burning. Once the canopy was opened up and we started burning at Tallahatchie Experimental Forest (2010), we started seeing and hearing the calls of bobwhites (for the first time since I'd been working there (1998)).

For these reasons, I suggest that open woodlands be ONE of the desired conditions in areas currently designated as being appropriate for Northern Dry Upland Hardwood Forests. [Comment 18-16:]

Thanks for humoring me.

Steve

Letter Number 19

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

June 20, 2013

Mr. Jeff Long
Forest Plan Revision Team Leader
National Forests in Mississippi
200 S. Lamar St., Suite 5OO-N
Jackson, MS 39201

RE: EPA Comments on the Draft Environmental Impact Statement (DEIS) for the Revised Land and Resource Management Plan National Forests in Mississippi. CEQ#: 20130021.

Dear Mr. Long:

Pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) reviewed the Draft Revised Land and Resource Management Plan (LRMP) for National Forests in Mississippi and the associated Draft Environmental Impact Statement (DEIS). The land and resource management plan is a revision to the Forest Service's 1985 Forest Plan.

The National Forests in Mississippi encompass 1.2 million acres ranging from pine forests in the Gulf Coastal Plain to Upland Hardwoods in Northern Mississippi. The DEIS analyzes the Forest Service's proposal to manage six National Forests in Mississippi for the next 10 to 15 years. The current plan "incorporates new information, evolving issues and trends, accounts for changes in national policies and directions and updated views from the public and other stakeholder groups. The intent of the plan is to reflect changing needs and values of the public while focusing on sustainable management of the National Forest System Lands for the Future. The forests in the revised plan include: Bienville National Forest; Chickasawhay Ranger District of the DeSoto National Forest; DeSoto Ranger District of the DeSoto National Forest; Delta National Forest; Holly Springs National Forest; Homochitto National Forest; and Tombigbee National Forest.

EPA appreciates the Forest Service's consideration and evaluation of significant amounts of information and input during the preparation of the revised LMRP. The LMRP proposes Goals and Desired Conditions, Objectives, Standards and Guidelines, and Monitoring and Evaluation for the various revision topics, and allocates land to designated Management Areas on 1.2 million acres of national forest land in Mississippi to guide Forest management. We recognize that there are challenges involved in national forest management including; the complexities associated with the LRMP revision topics; statutory and regulatory requirements; and mixed-land ownership patterns. In addition, we acknowledge the Forest Service's effort to involve the public in land management decisions. The proposed action not only updates the goals and desired conditions, objectives, standards and guidelines, and monitoring requirements. It also includes designations for 18 new Special Areas. The new management direction is focused on restoring natural resources and natural processes and creating and maintaining diverse wildlife habitats.

The DEIS addresses the following issues: (1) Native Ecosystem Restoration; (2) Biodiversity and Species Viability; (3) Forest Health; (4) Vegetation Management for Timber; (5) Fire Management; (6) Old Growth; (7) Watersheds and Water, Soils, Aquatic Resources, Riparian Environments; (8) Access Management; (9) Recreation; (I0) Special Area Designations; (11) Land Use and Ownership; (12) Climate Change; (13) Minerals Management; and (14) Economic Benefits. EPA's comments include a review of the alternatives, environmental issues and ratings of both the environmental impact of the proposed action and the adequacy of the DEIS.

Five alternatives (A, B, C, D and E) are evaluated in the revision of the Land and Resource Management Plan (LRMP or Forest Plan) DEIS for the National Forests in Mississippi. Alternative A is the custodial management alternative which promotes minimal intervention by active management. Alternative B represents no change from the current LRMP. Alternative C is the preferred alternative and is the foundation for the Proposed Plan. Alternative D accelerates the restoration of historical forest conditions and Alternative E emphasizes improved forest health. EPA supports the identification of a preferred alternative in the DEIS.

EPA appreciates the comparison of alternatives description summary. According to the DEIS, the desired conditions of the ecosystem-based management areas do not vary under any of the alternatives considered. However, the rate that these conditions will be achieved and the actions required were the key differences. Alternative A will restore the fewest acres of native ecosystems during the life of the plan. This plan would favor hardwood components. Alternatives Band C assume current funding levels, but Alternative C places more emphasis on the integration of restoration efforts (pg 24). Alternative D results in an increase in the rate and acreage restored over the life of the plan. Alternative E further increases acreage restored as a result of thinning out more acres of forest resulting in improved forest health and resiliency. While Alternatives D and E appear to maximize the acreage restoration efforts, the DEIS indicates that additional funding would be needed to achieve these results.

EPA recommends management of National Forests place emphasis on sustaining the ecological values of healthy forests. This should include: Protection of water quality and yield, sensitive groundwater recharge areas, and undisturbed headwaters of streams and public drinking water supplies. Greater attention to the adverse impacts of logging roads and the value of undisturbed buffer zones along streams and rivers and the designation of wild and scenic rivers. Soil quality maintenance and nutrient stocks that hold the key to current and future forest productivity should also remain a priority. Conservation of forest biodiversity by reducing forest fragmentation (as a result of clearcuts and roads), avoiding harvest in vulnerable areas such as hardwood or old growth stands and riparian zones, and restoring natural structural complexity to cutover sites. [Comment 19-15:]

EPA commends the Forest Service on its attempt to identify and address issues such as climate change and invasive species such as cogan grass and kudzu which are threats to native species, development and population growth, changes in recreational patterns, including the use of off road/highway vehicles and land ownership patterns (interspersion of the National Forests with private homes) making consistent best management practices challenging, adaptive management plan to address changing conditions.

EPA understands the need for multiple-use activities and supports management of National Forests that place less emphasis on traditional harvesting and other consumptive uses (e.g., mining) and a greater emphasis on recreation and ecosystem enhancement. EPA rates this document EC-I Environmental Concerns and no additional information requested See EPA Ratings Enclosure). We have concerns about the potential biological impacts from these actions including stream sedimentation, loss of habitat, reduction of biodiversity, and species impacts.

We appreciate the opportunity to review the proposed action and appreciate the revised agency review schedule based on the regional receipt date of the document. Please contact Ntale Kajumba at 404 562-9620 or Ken Clark at (404) 562-8282, if you have any questions on our comments. When the FEIS is available for review, please send a minimum of one hard copy and one CD to EPA Region 4 for review to the address above.

Sincerely,

Heinz J. Mueller, Chief
NEPA Program Office
Office of Environmental Accountability
Enclosure: Summary of EPA Rating System
Detailed Comments and Articles

Detailed EPA Comments on Revised Land and Resource Management Plan National Forests in Mississippi DEIS.

ECOSYSTEM RESTORATION METHODS

EPA recommended that future forest land and resource management plan DEIS include more quantitative evaluation. One method for quantitative evaluating ecosystem restoration includes that of environmental accounting (see Odum, H.T. (1996) Environmental Accounting: Emergy and Environmental Decision Making, Wiley, U.S.A). Environmental accounting utilizes emergy principles to evaluate all of the processes in an ecological system by back calculating the solar energy that it took to get to an equilibrium state for the processes. The value is in solar emjoules and because all of the processes are calculated using the same metric, it is feasible to value all of the processes and relationships.

We have attached and/or referenced three other documents for your future consideration, Assessing environmental costs and impacts o[jorest1y activities: A multi-method approach to environmental accounting by Elvira Buonocorea, Tiina Hayhaa, Alessandro Palettob, Pier Paolo Franzesea, Valuing Forest Ecosystem Services In Maryland And Suggesting Fair Payment Using The Principles OJ Systems Ecology and Environmental Accounting OJ Natural Capital and Environmental Services OJ The Us National Forest System by Elliott Campbell, 2008. For more information on energy analysis contact Dan Campbell at campbell.dan@epa.gov. [Comment 19-5:]

FOREST HEALTH AND PROTECTION

According to the DEIS, the three most important forest health issues for the National Forests in Mississippi are non-native invasive species, southern pine beetles and the need to improve old- growth. Overall forest health will be positively influenced by Alternatives C, D and E while Alternative A will result in the deterioration of the overall forest-wide forest health. The overall strategy for achieving healthy forests involves using a combination of vegetation management practices and prescribed burning to restore and maintain native ecosystems. The vegetative management emphasis is on thinning; converting loblolly and slash pine stands that are not on appropriate sites to longleaf and shortleaf pine forests; and restoring rare communities and old growth; which should improve native species diversity and resilience of ecological communities to non-native invasive species, disease and insect outbreaks, extreme weather disturbances associated with climate change, and other stressors. EPA notes that alternatives C-E, with implementation of best management practices, would appear to be the best approach for ecosystem restoration. [Comment 19-6:]

FIRE MANAGEMENT AND AIR QUALITY.

The activity most likely to affect air quality is prescribed burning. The DEIS indicates that while Alternatives C, D, and E will provide the highest level of hazardous fuels reduction and ecological restoration and maintenance; it will also result in 220,000; 240,000 and 251,000 acres of prescribed fires, respectively. Alternative B, at an average annual prescribed fire program of 190,000 acres, will contribute to fuels management and ecological restoration, but will probably relegate some restoration of rare ecological communities and control of non-native invasive plant species to occurrences embedded in large and landscape bums as has been done in the past with less emphasis on growing season burning. Alternative A will restrict the prescribed fires to four districts involving 121,000 acres.

Recommendation: EPA recommends that the Forest Service continue to comply with the federal and state guidelines associated with prescribed bums. EPA notes that Alternatives A and B will result in the less air quality impacts in the short-term. While Alternatives C, D, and E will result in the greatest hazardous fuels reduction and ecological restoration and maintenance, they will also contribute to the greater air quality impact. Increased prescribed burning during the growing season will result in more particulate

matter and ozone formation. However, according to the DEIS the increase is not expected to affect the attainment of federal and state air quality standards. [Comment 19-7:]

WATER QUALITY

According to the DEIS, forest management activities are not anticipated to substantially or permanently impair water quality nor result in measurable changes to overall watershed condition ranking. The implement of mitigation measures, such as use of best management practices (BMP's) and adherence to forest standards and guidelines are proposed. Nevertheless, timber harvesting in forests will result in some soil and water impacts associated erosion, increased sedimentation, and reduction of water quality.

Recommendations: EPA supports the effective use of BMPs and adherence to forest standards and guideline for water quality. We recommend reducing the nonpoint source pollution of surface and ground waters that can result from forestry activities. These activities include but are not limited to:

• Tracking the implementation of best management practices (BMPs) used to control nonpoint source pollution generated by forestry practices.

• Developing water-quality monitoring plans to evaluate the effectiveness of forestry

BMPs in meeting water-quality goals or standards.

• Design of monitoring projects and the selection of variables and methods to correlate BMP implementation with changes in stream water quality. Providing information on methods for sample site selection, sample size estimation, sampling, and result evaluation and presentation. The focus is to develop statistical approaches needed to collect and analyze data that are accurate and defensible.

• EPA supports efforts to implement the nonpoint source (NPS) total maximum daily load (TMDL) program. Nonpoint source TMDLs and watershed-based plans designed to implement the NPS TMDLs, provide the necessary link between actions on the ground and the water quality results to be achieved.

• EPA continues to support planning at the landscape level to address broader ecological concerns such as biodiversity, watershed maintenance and restoration, and forest fragmentation.

• EPA recommends that ecological and other environmental values should be the primary, driving factors in the identification, protection, and management of roadless areas in the National Forests. [Comment 19-8:]

SOILS

According to the DEIS, implementation of the best management practices, proper mitigation measures, and monitoring will result in minimal soil effects for all alternatives. The cumulative effects of management actions over time are not expected to reduce soil productivity. Mitigation measures for management activities such as timber harvesting, site preparation and prescribed burning should help maintain the litter layer in place, or replace the litter layer on exposed soils by seeding and fertilization and impacts associated with any one treatment should be recovered within three years.

Recommendations: EPA recommends commitments to best management plan, mitigation and monitoring should be documented in a summary tracking form of project commitments. [Comment 19-9:]

CLIMATE CHANGE

The previous forest plan did not address the increasing weather variability and climate change projected for the future. These issues are expected to continue to grow over the life of the revised forest plan.

According to the DEIS, the key factors expected to affect Mississippi's Forests in the near term (10-15 years) include an increase in extreme weather events such as hurricanes, heat waves, droughts, tornadoes, floods, and lightning storms. Previous storms such as Hurricane Katrina resulted in damage to all of the National forests in MS including 300,000 acres of timber damage, and high winds and downed trees, blocked roads, closed trails, facilities and recreation site damage, and red-cockaded woodpecker tree damage and cluster loss.

The DEIS includes strategies that address the effects of increasing weather disturbances and responding to anticipated climate changes. These strategies are incorporated into the alternatives and include reducing vulnerability by maintaining and restoring resilient native ecosystems, enhancing adaptation by reducing impacts from serious disturbances and taking advantage of disruptions, using preventative measures to reduce opportunities for forest pests, and mitigating greenhouse emissions by reducing carbon loss from hurricanes.

National forests can play an important role in both mitigating and adapting to climate change. Mitigation measures focus on strategies such as carbon sequestration by natural systems, ways to increase carbon stored in wood products, ways to provide renewable energy from woody biomass to reduce fossil fuel consumption, and ways to reduce environmental footprints. Adaptation measures address ways to maintain forest health, diversity, productivity, and resilience under uncertain future conditions.

Recommendation: The DEIS indicates that the Forest Service's research activities are expected to help both public and private land managers better understand changing conditions and determine appropriate management approaches for both adaptation and mitigation. EPA notes that by restoring native longleaf pine where loblolly and shortleaf pine currently exist, Alternatives C, D and E would result in a national forest less vulnerable to the effects of climate change than Alternative A. [Comment: 19-10]

MINERALS MANAGEMENT

An oil and gas leasing decision authorized lands on the National Forests in Mississippi to be available for Federal oil and gas leasing. The alternatives in the DEIS include the 20 I 0 oil and gas leasing decision as part of an ongoing management direction. The only exceptions to the decision are congressionally designated wilderness areas and the deferred Sandy Creek RARE II Further Study Area. This EIS addresses the decision to make oil and gas leasing available on the Sandy Creek. AREA 11 study area. The DEIS indicates that Alternatives A and B would not allow oil and gas leasing in the Sandy Creek RARE II study area. Alternatives C, D, and E would permit oil and gas leasing in the Sandy Creek RARE II study area. However, certain restrictions associated with the 2001 Roadless Area Conservation Rule apply including no new road construction permits in the Sandy Creek RARE II study area;

Recommendation: EPA supports restrictions on new roadway construction in the Sandy Creek RARE II study area and protecting sensitive natural resources. [Comment 19-11:]

INFRASTRUCTURE/ROADS

The effect of vegetation management which varies by alternative on infrastructure is that alternatives C, D and E which have higher levels of timber harvests will provide higher levels of funding to upgrade and maintain existing roads. Alternative A, having a minimal level of timber harvest, would provide less funding for road maintenance. Because there is very little need for new road construction under any alternative, road infrastructure is expected to have little impact on other resources based on alternative. However, road maintenance and reconstruction would vary by alternative with greater need for these activities as vegetation management activities increase from alternative A through E. [Comment 19-12:]

ENVIRONMENTAL JUSTICE

EPA notes that the Environmental Justice Assessment included demographic information regarding low-income and minority populations. The DEIS indicates that benefits would accrue to all segments of the population and no disproportionate negative environmental or health impacts are anticipated. We also note that the DEIS indicates that no segments of the population identified that depend on subsistence consumption of fish, wildlife, or vegetation within the planning area.

Recommendation: The EJ analysis should indicate the efforts made to identify subsistence consumption within the planning area that targeted low-income and minority populations and summarize any EJ concerns raised during the public engagement process, particularly in those areas that experience higher minority and low-income populations. [Comment 19-13:]

FRAGMENTATION

Extensive clear cutting has resulted in the fragmentation of many forested ecosystems into smaller patches that have more forest edge exposed to open, cutover habitats (Harris 1984). The effects of such fragmentation on forest remnants include changes in the microclimate (Chen et al. 1995), in species composition, and in species behavior. Changes in species composition may include loss of some species as a result of unsuitable forest microenvironment competitive interactions with species at the forest edge, or insufficient total foraging habitat. The change in microclimate at the forest edge may also affect seed dispersal, movement of flying insects, decomposition rates, and size of plant and animal populations.

Recommendation: EPA recommends forest managers examine the effects of fragmentation on a species-by species basis with emphasis placed on threatened and endangered species and also "keystones" species that play an important role in an ecosystem relative to their abundance and whose removal has large ripple effects on other plants and animals as well as on ecological processes. To reduce the impact of timber harvesting on biodiversity, EPA recommends forest management consider the mosaic of forest patches on the landscape and the connectedness of habitat for forest species in planning future cuts. [Comment 19-14:]

Environmental Impact Statement (EIS) Rating System Criteria

EPA has developed a set of criteria for rating draft EISs. The rating system provides a basis upon which EPA makes recommendations to the lead agency for improving the draft EIS.

• Rating the Environmental Impact of the Action

• Rating the Adequacy of the Draft Environmental Impact Statement (EIS)

RATING THE ENVIRONMENTAL IMPACT OF THE ACTION

LO (Lack of Objections) The review has not identified any potential environmental impacts requiring substantive changes to the preferred alternative. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposed action.

EC (Environmental Concerns) The review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact.

EO (Environmental Objections) The review has identified significant environmental impacts that should be avoided in order to adequately protect the environment. Corrective measures may require substantial

changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). The basis for environmental Objections can include situations:

EU (Environmentally Unsatisfactory) The review has identified adverse environmental impacts that are of sufficient magnitude that EPA believes the proposed action must not proceed as proposed. The basis for an environmentally unsatisfactory determination consists of identification of environmentally objectionable impacts as defined above and one or more of the following conditions:

RATING THE ADEQUACY OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

1. (Adequate) The draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or Information.

2. (Insufficient Information) The draft EIS does not contain sufficient information to fully assess environmental impacts that should be avoided In order to fully protect the environment, or the reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the proposal. The identified additional information, data, analyses, or discussion should be included in the final EIS.

3. (Inadequate) The draft EIS does not adequately assess the potentially significant environmental impacts of the proposal, or the reviewer has identified new, reasonably available, alternatives, that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. The identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. This rating indicates EPA's belief that the draft EIS does not meet the purposes of NEPA and/or the Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS.

Letter Number 20

Revised Land and Resource Management Plan

Comments from Migratory Bird Research Group, University of Southern Mississippi

The revised plan calls for 4 bird species to be used as Management Indicator Species. Those species will be monitored to assess the effectiveness of management plans for different habitat types:

Red-cockaded Woodpecker: Mature pine forest. Actively manage for this endangered species.

Pileated Woodpecker: Mature forests with snags/cavities

Wood Thrush: Tracts of unbroken forest

Hooded Warbler: Mature forest

We feel that Hooded Warbler should be removed from the list, as we found them in pretty much every type of habitat (from mature forest to scrub/shrub) during our breeding season point counts. Possibly a better indicator species for mature forest would be Acadian Flycatcher; this species was most often only found in draws in forest stands. [Comment 20-1:]

If we understand correctly, Wood Thrush was selected in order to monitor the effectiveness of reducing edge habitats. You might consider as an alternative (or in combination) Indigo Buntings, as they are closely tied to edges. We feel that it would be appropriate to monitor the population levels of Indigo Buntings to determine the amount of edge habitat in the landscape. [Comment 20-2:]

Frank Moore, TJ Zenzal, Will Lewis, Kristen Covino, Jill Gautreaux, Emily Lain

Migratory Bird Research Group, University of Southern Mississippi

A.3 Response to Comments

Comment letters begin at number 3 because during setup of the Comment Analysis and Response Application (CARA) database the first two letters received in the data base were generated internally to ensure proper setup of the public comment database prior to the public comment period beginning.

In this section the identified comment is presented in *italics* immediately followed by a crosslink reference to the original letter number. The first number for a comment number refers to the associated letter number for that comment. The second number is the sequential number assigned to the comment by the CARA database application. A table follows each comment showing the categories that were assigned to that particular comment. Clicking on each category in the table will provide a listing of all other comments assigned to that category.

Comment 3-1:

Cooperation with the Natchez Trace Parkway would be really wonderful. In Virginia the Blue Ridge Parkway, sister of the Natchez Trace, goes through 5 or more National Forests. This gives the visitor a chance to enjoy the beauty of the forest with full measure. One can stop and walk away from the roadway at any point you choose and be away from the sounds of passing vehicles. Such an experience would greatly enhance the Parkway across the state of Mississippi and make it a true National Treasure like the Blue Ridge. Perhaps a land swap could help facilitate acquiring land along the Trace.

Letter Number 3:

Trails Management (152)	Recreation Management (160)	Land Acquisition and Exchanges (170.03)

Response 3-1:

The Natchez Trace Parkway runs through the Trace Unit of the Tombigbee National Forest in Chickasaw and Pontotoc Counties. The Forest Service manages the Chickasaw ATV Trail which lies west of the Natchez Trace Parkway in north Chickasaw County. Section 2.6.4 of the revised plan describes the desired conditions for lands and special uses and provides plan direction that would support acquisition of additional lands along the Natchez Trace Parkway if they were available. However, the revised plan does not make site specific land acquisition decisions. If such and opportunity becomes available a project level decision would be appropriate.

Comment 3-2:

Old Growth Areas enhance the hiking experience with their scenic nature and support threatened ecosystems by preserving the diversity of plants and animals. They also help in water retention.

Letter Number 3:

Hiking, Backpacking (165.01)	Inherent Worth of Nature (230.02)	Water Resources (232)

Response 3-2:

We concur with your statement. The plan's desired condition for old growth can be found in Section 2.6.2 and old growth management objectives are in section 3.5.2.

Comment 3-3:

Increased hardwoods makes an area more scenic and helps support a greater population and diversity of birds, etc.

Letter Number 3:

Biological Resources Management (140)	Diversity, Extinctions (240.02)

Response 3-3:

The revised plan provides management direction for hardwood ecosystems.

Comment 3-4:

Nature Trails and Lakes are very valuable to the public for recreation, enjoyment, and better knowledge of the outdoors.

Letter Number 3:

User Education (160.02)	Visual Resource Management (160.04)	Trailheads, Signs, Parking (163.03)	Water Activities (163.04)

Response 3-4:

Thank you for your comment. Section 2.8.1 of the revised Forest Plan gives a description of desired conditions for recreation on the National Forests in Mississippi which concurs with your comment.

Comment 4-1:

I think you need to ban new roads and take out of use all roads that can be eliminated, too many roads.

Letter Number 4

Transportation Analysis (150.03)	Road Closure, Decommissioning (151.02)

Response 4-1:

Section 2.7.1 of the revised Plan addresses the concerns you raised regarding road system management.

Comment 4-2:

I ask for wilderness and wild and scenic river designations wherever possible.

Letter Number 4

Designated Wilderness Areas (171.02)	Wild and Scenic Rivers (171.07)

Response 4-2:

Analyses of potential wilderness recommendations are documented in Appendix C of the final environmental impact statement.

Comment 4-3:

Stop all burning because such burning of vegetation creates dirty polluted air. it isn't the smoke you have to worry about, its the fine particulate matter which is microscopic. that gets picked up by the atmosphere

and carried all the way to the east in America. Many are sent to hospitals or die from the fine particulate matter which enters the body and causes pneumonia, allergies, asthma, strokes, heart attacks and LUNG CANCER.

Letter Number 4

Prescribed Burns (136.03)	Safety, Risk Management (136.05)	Smoke Management (136.07)	Public Health, Safety (182.02)

Response 4-3:

Prescribed fire is an important and essential management tool for attaining the desired conditions for the fire dependent ecosystems which dominate the landscape across the National Forests in Mississippi. The revised Plan and associated final environmental impact statement evaluates the role of fire and the associated impacts resulting from application of prescribed burning across the landscape. See Section 4.2 in the final environmental impact statement for a description of the air quality program and prescribed fire procedures.

Comment 4-4:

WE OPPOSE LOGGING

Letter Number 4

Timber Management (142)

Response 4-4:

Vegetation management practices are utilized as a management tool to achieved desired ecological conditions, improve and maintain habitat for a diverse array of species, including several threatened and endangered species.

Comment 4-5:

WE OPPOSE TRAPPING AND HUNTER, THESE SITES WERE SAVED EXPRESSLY FOR WILDLIFE.[...]THEY NEED TO HAVE PEACEFUL TIME TO USE THESE SITS, ALONG WITH HIKERS, BIKERS, PHOTOGRAPHERRS AND HORSE BACK RIDERS.

Letter Number 4

Hunting, Shooting (165.03)

Response 4-5:

Section 2.8.1 of the revised plan describes the vast array of recreation opportunities available to National Forest visitors.

[Note: Comment 4-6 was eliminated during review and response to comments.]

Comment 4-7:

NO TOXIC CHEMICALS SHOULD BE USED IN ANY OF THESE SITES. IT RUNS INTO THE WATER AND POLLUTES THE WATER. WE WANT CLEAN UP PLEASE.

Letter Number 4

Water, Watershed Management (132)	Chemical Vegetation Treatment (141.04)	Water Quality (232.05)
Health, Safety (282.02)		

Response 4-7:

Section 4.2.6 of the revised plan provides guidelines that address both human and wildlife health and safety concerns for projects that may require the application of pesticides to achieve desired conditions.

Comment 5-1:

There has been a long time proposal to Re-River the Little Tallahatchie River in the Holly Springs National Forest. The proposal is to breech the low-head dam at the Cypress Creek- Puscus Creek and the Tallahatchie Canal. The low-head dam turns the normal flow from the Cypress Creek and Puscus Creek into the Little Tallahatchie Canal to flow into Sardis Lake. The breeching of the low-head would turn the normal flow of the two creeks into the old river run of the Little Tallahatchie River. The old river run meanders 22 miles down the bottom land hardwoods before empting into Graham Lake which is a part of Sardis Lake. The Channelized Tallahatchie Canal runs the same bottom but is only 13 miles in length. The old river run is primarily intact with only three known obstructions that could easily be dislodged with "ditching" Dynamite. The old river run and the proximity bottom-land hardwood are in pristine condition and would make an ideal scenic river for canoeing and hiking. There would be little initial expense and almost no maintenance cost. The Friends of the Upper Sardis Wildlife Management Area has proposed a detailed concept of the re-river of the Little Tallahatchie River.[...] The changing of the water flow in the old river run and the canal will have no impact on the flooding or the Sardis Lake Level. The low head dam allows water into the old run when the water is high in the canal. The same water flows in one or the other. All the water flows to the same destination of Sardis Lake.

Letter Number 5

Water, Watershed Management (132)	Water Resources (232)

Response 5-1:

Your comment regarding the Little Tallahatchie River "re-river" proposal in the Holly Springs National Forest is beyond the scope for consideration in the revised Land and Resource Management Plan. The proposal would involve multiple jurisdictions requiring a more detailed site specific environmental evaluation that is beyond the scope of analysis for plan revision.

Comment 5-2:

I continue to be concerned with the cutting of old growth timber on the Holly Springs and Tombigbee National Forest. The soil is predominately sandy and the cutting of roads for hauling logs and the damage of logging skidders used to pull logs to bunching sites promote erosion and permanent washes and future gullies on the land.

Letter Number 5

Timber Management (142)	Road Construction, Maintenance (151.01)	Watershed Condition (232.06)
Disturbance, Erosion, etc. (234.01)	Transportation System (250)	

Response 5-2:

The revised plan provides old growth management direction in sections 2.6.2 and 3.5.2. Standards and guidelines provide guidance for achieving resource protections applied to projects or activities aimed at achieving desired conditions (see Section 4.2 of the revised plan for a listing).

Comment 5-3:

Davis Lake in the Tombigbee National Forest has the potential to be a prominent campsite and bass fishing draw in all of Mississippi. The Davis Lake website on the National Forest Website is pathetic. It neither promotes the great fishing nor the quiet, serene setting of the campsite.[...] Puscus Lake in the Holly Springs National Forest has outstanding campsites, picnic areas, walking trails and good fishing. The problem is the lake has so silted it is only 3-5 feet deep in almost all the lake. The area is worth investment to improve the facilities.

Letter Number 5

Developed Recreation and Facilities (163)

Response 5-3:

Comment noted, thank you for your suggestions.

Comment: 6-1:

In the past Columbus AFB has received a call when projects such as these are in the vicinity of our Military Training Routes (MTRs). Columbus AFB will generally close our MTRs for that period of time, especially if there are helicopters flying in the vicinity. We ask that you continue this process.

Letter Number 6

Military Activities (149.03)

Response 6-1:

Thank you for your response. The revised plan does not proposed changes to established protocols where project implementation may affect Military Training Routes (MTRs).

Comment 7-1:

Interested in receiving any information on trail systems.

Letter Number 7

No Further Response Required (102)	Trails Management (152)

Response 7-1:

Thank you for your expressed interest in National Forest System trails.

Comment 8-1:

Any of these updates should be forwarded to the NFCAD updates team headed up by Marilena Lea and Fatou Jack. I have cced them on this message so I'm sure whoever on the team has that State will make the update in the directory.

Letter Number 8

No Further Response Required (102)	Beyond Scope (102.01)

Response 8-1:

Letter appears to have been sent in error. The letter does not address National Forest in Mississippi management issues or concerns within the scope of plan revision.

[Note: During review and response to comments, on letter number 9, the original comments were recoded which resulted in the first comment for letter number 9 to begin at 9-21.]

Comment 9-21:

Overall, this management plan is very good. Our primary concern is that this plan is far too ambitious to be realistic when one considers the state that the forests are currently in. The 10- year goals laid out in the Strategies are probably attainable, but even if accomplished, these practices would only be a small step towards accomplishing the Desired Conditions laid out in Chapter 2. In short, most of the Desired Conditions appear to be written to appease the reader rather than to actually guide the management of the forest.

Letter Number 9

Proposed Action, Decision (120)

Response 9-21:

The revised plan modeled outcomes for 5 decades. It was apparent from this modeling that attaining the desired conditions for the major systems was likely to take over a century, even for the proposed action alternative. The outcomes for each alternative are mostly driven by program level and slight changes in emphasis for restoration in Alternative D and forest health in Alternative E. However, the desired conditions are the same for the proposed action and all alternatives in the Final Environmental Impact Statement. These desired conditions set direction and priority so that annual programs make incremental steps in the right direction. With any added resources, the analysis is complete and the direction is set to focus additional accomplishment in the right direction as well.

Comment 9-22:

General Comments in regard to Prescribed Burns on all habitat types requiring burns (Specifically 2.3.1, 2.3.6, 2.3.13, 2.3.14, 2.3.17, 2.3.18, 2.6.3, 3.2.1, and possibly others). The majority of USFS prescribed burns occur during the cool season (early months) rather than later, warmer months. Ecologically, these ecosystems would be better served with a significant portion of the burns occurring in the warm/hot season, which would more effectively control shrubs, invasive species, and non-adapted hardwoods. Several of these habitat types will likely be too wet to carry cool season burns (i.e. wet pine savannah, seepage bogs and flats, etc.). In addition, early season burns may cause problems with rare breeding and migrating amphibians, such as gopher frogs and Webster's salamanders (the latter of which is provided as an example of an uncommon species in multiple habitats within this document). Additionally, there

needs to be some consideration for smaller-scale (<=100 acres) burns at least within the boundaries of Wildlife Management Areas. That could be something to take the cooperative MDWFP/USFS agreement a step further. These smaller burn units can reduce potential productivity limitation on some wildlife when large very blocks are burned at once.

Letter Number 9

Prescribed Burns (136.03)	Unit Fire Plans (136.04)

Response 9-22:

The proposed action projected outcomes include 40% growing season prescribe burning attainment. This is an attainable goal based on our experience and expected capabilities. It is agreed that some small scale prescribed burns will be beneficial to attain wildlife goals. There are other vegetation management goals facilitated by small scale burns such as site preparation for regeneration, release and thinning of regeneration, and brown spot disease control in longleaf regeneration. Planning these burns is a project level consideration below the broad scale direction set in the Forest Plan. A restriction in the standards and guides on burn size, or requiring some level of small scale burns would limit our ability to attain the overall goals and objectives of the plan and would increase the return interval between burns.

Comment 9-23:

1.1.2 Management Challenges, Page 3.We suggest including fragmentation of forest lands by new road construction and increased difficulty in conducting management activities, particularly fire, due to this fragmentation. These construction projects also often result in a loss of habitat for listed and SGCN species.

Letter Number 9

Diversity, Extinctions (240.02)

Response 9-23:

Section 2.7.1 of the revised plan describes the management strategy and desired conditions for National Forest System roads. Very little new road construction has occurred in recent years, the revised plan does anticipate need for new road construction over the next 10 to 15 years.

Comment 9-24:

1.3 Plan Purpose, Page 5. We suggest adding, as an important factor in guiding management actions, the following purpose decision statement: To incorporate state-of-the- art management practices designed to optimize habitat productivity for native wildlife in all silvicultural activities. Given the laudable goal expressed on Page 7, Paragraph 5, Line 2 which states"..a focus on restoring and sustaining the native ecological communities...,"the development and incorporation of the above statement as an additional management guide would be a significant addition assisting in realizing the concept of restoring and sustaining native ecological communities.

Letter Number 9

Purpose and Need (120.01)

Response 9-24:

The revised plan supports an adaptive management approach open to implementation of best available science based management practices to achieve desired conditions.

Comment 9-25:

Chapter 2. Vision. The premise of this chapter is somewhat confusing. It is difficult to tell whether it is describing the "desired condition" or the current condition of the forest. For the purposes of this review, we assume the author is describing the "desired future condition." Perhaps if the verb tenses were not present tense it would be easier to discern.

Letter Number 9

Technical, Editorial (123)

Response 9-25:

The desired conditions described in Chapter 2 of the revised plan reflect the ecological, economic, and social attributes that we expect to exist on these national forests in the future.

Comment 9-26:

The plan states "These desired conditions reflect the ecological, economic, and social attributes that we expect to exist on the National Forests in Mississippi in the future." This needs more explanation. Based on the Desired Conditions as they are written, it appears that the USFS plans to manage for an unnaturally high level of mature timber, which will likely spoil. In this case it appears the goals of ownership are dominated less by ecological and economic objectives and more by social and aesthetic objectives. There should be some discussion of this decision making process and exactly how the USFS arrived at the Desired Conditions so that the reader understands that the Forest Service: 1) is not simply making up numbers to appease the public and 2) does not believe that managing 60-80% of forests in mature timber is a sustainable condition over the long-term or ecologically and economically efficient.

Letter Number 9

Effects Analysis (122)	Technical, Editorial (123)	Environmental Quality and Ecosystem Integrity (230.01)

Response 9-26:

A Forest with 60 % over 60 years old can be maintained with 40 % less than 60 or 6.7% regeneration per decade. This would be about a 150 year rotation. For a desired condition combination of Shortleaf, Longleaf and Hardwood Forest types this is not unreasonable. (3.3%/decade for 80% over 60 or a 300 year rotation is a less reasonable expectation.) There is no statement in Chapter 2 Vision of the Revised Land and Resource Management Plan which sets 60-80% of the forest in mature timber as a desired condition. Desired conditions for systems are stated that they be dominated by mature forest (60 years old or older). Modeling was done with 120 year rotations for Shortleaf and Longleaf, 130 for upland hardwoods and 200 for floodplain hardwood. However, the effective rotations set by program budget levels are not sustainable without excessive mortality and either natural regeneration filling in canopy gaps or crisis responses when mortality events occur.

Comment 9-27:

2.2 Forest-wide Desired Conditions, Page 8. The document states that gopher tortoises are growing and thriving in restored habitats. Tortoises are doing exceptionally well in only a few areas within FS lands. Surveys indicate that most priority soils parcels do not harbor thriving gopher tortoise populations, but rather a decline in recruitment (as noted later in the management document.

Letter Number 9

Animal Species: TES, etc. (243.01)

Response 9-27:

The statement in Section 2.2 is a desired condition description and was not intended to describe or reflect existing conditions or status.

Comment 9-28:

2.3 Ecosystem Diversity, Page 12, Table 2. We suggest that this table be modified to reflect current ecological systems within each unit of the forest followed by desired conditions. Line 1 of Paragraph 2 on Page 12 indicates that "Table 2 displays the approximate current and desired percentage of each ecological system...," but it appears that the table only reflects draft plan "desired conditions." It is difficult to perform constructive review without existing conditions classified ecologically by unit of the system using the same classification criteria used for the presented desired conditions. We concur with utilizing a range of values but withhold specific comment on the appropriateness of specific management unit percentages until existing conditions, expressed as percentages, can be reviewed. The language provided addressing current conditions in sections 2.3.1 - 2.3.24 is rather general in nature and does not provide the needed specific information to complete constructive review of this extremely important table.

Letter Number 9

Technical, Editorial (123)	Species: TES, etc. (240.03)

Response 9-28:

Your suggestion was incorporated in Appendix B of the revised plan. Current and desired percent of ecological system by unit is depicted in Table 14.

Comment 9-29:

2.3.2 Shortleaf Pine-Oak Forest, Page 15. In paragraph 2, first sentence, Northern Bobwhite is misspelled northern bob-white.

Letter Number 9

Technical, Editorial (123)

Response 9-29:

Thank you. Correction has been made.

Comment 9-30:

The Desired Condition for these forest types consist of mature forest with less than 80% canopy closure, a sparse mid-story, and dense grasses and forbs in the understory. This condition is conducive to many

species of wildlife, indeed. The burn rotation described may be adequate to maintain such a forest, but creating these conditions from the current forest conditions will be difficult to impossible. Current conditions of many of these forests have greater than 90% canopy closure with a dense mid-story of shade tolerant hickories and other saplings. If timber harvests are conducted to open the canopy, the shade-tolerant mid-story will be released. Foresters should give some consideration to herbicide treatments where dense mid- stories exist prior to overstory manipulations. We recommend adding these intermediate steps.

Letter Number 9

Effects Analysis (122)	Vegetation Management (141)

Response 9-30:

We concur with your assessment. Herbicide treatments are included in the set of management tools available to achieve desired conditions.

Comment 9-31:

2.3.6 Northern Dry Upland Hardwood Forest, Page 17. The stated desired condition for this forest is a closed canopy stand with a sparse mid-story and regenerating hardwoods. Certainly any regeneration in this condition would be shade tolerant and not indicative of the current overstory condition. We recommend giving better attention to future regeneration practices to promote a mixed oak-hardwood forest.

Letter Number 9

Effects Analysis (122)	Vegetation Management (141)

Response 9-31:

The desired condition for dry upland hardwoods was written into the draft plan to reflect what we expected to be able to accomplish with likely resources. Your comment is valid and scientifically based. The desired condition of dry upland hardwood has been edited in the revised Land and Resource Management Plan to state that it will contain some open canopy conditions. In addition, oak species composition for northern dry upland hardwoods has been edited to substitute black and scarlet oak for white oak. Chapter 3 of the revised Land and Resource Management Plan has a stated objective for the first decade to reduce the density of 1700 acres of dry upland hardwood and restore dry upland hardwood on 1600 acres from the loblolly forest type. These activities result in a relatively small percentage increase in acreage of dry upland hardwoods and open canopy conditions.

The interdisciplinary team developing the plan was concerned that areas opened with overstory reductions to woodland conditions in dry upland hardwoods would be difficult to maintain with fire return intervals likely to be achieved. The revised Land and Resource Management Plan gives higher priority to threatened and endangered species habitat, and restoration of longleaf which supports many of the threatened and endangered species occurring on the Forest. A section has been added to Appendix C of the revised Plan to provide details on the vegetation management priorities for each district.

Comment 9-32:

Additionally, sites within this forest type are suitable for restoration of upland oak savannahs consisting of more fire-tolerant hardwoods with an open and grassy understory. This type of forest type was once

prevalent in North Mississippi. Upland oak savannahs should be considered as a restoration goal on appropriate sites.

Letter Number 9

Effects Analysis (122)	Vegetation Management (141)

Response 9-32:

Agree, but this was not emphasized due to shortage of resources to attain and maintain this as a desired future condition. The desired condition statement has been modified to permit some open canopy conditions to occur in this system. This is most likely to be attainable where dry upland hardwoods occur adjacent to shortleaf pine restoration areas since both systems require similar prescribe fire treatments for establishment and maintenance. See the description of priorities for management activities in Appendix C.

Comment 9-33:

2.3.9 Southern Mesic Slope Forest, Page 19, Paragraph 1, Last Sentence. We concur with the general observation that fire intensity and frequency has played a role in increasing pine composition within this ecosystem beyond probable historic composition. In its purest form, this ecosystem is highly valuable to native wildlife. Degradation to this system, caused in part by fire, could possibly affect local wildlife habitat productivity. The specific strategies presented for this community on Page 50 addressing use of fire may need to be further restricted using parameters such as high fuel moisture levels before fires are introduced.

Letter Number 9

Prescribed Burns (136.03)	Ecosystem, Habitat Health (240.01)

Response 9-33:

Thank you for your comment. Guidelines for prescribed fire were developed specifically to address this concern. See section 4.2.4 of the revised plan (guideline number 5).

Comment 9-34:

2.3.10 Northern Mesic Hardwood Forest, Page 19, Last Sentence. This sentence states 'Abundance of this system generally falls within the mid- to upper-end of the desired range as depicted in Table 2.' The absence of specific current conditions within the draft document makes it impossible to constructively address this statement. Based upon intimate staff knowledge of the existing condition of these systems within some units of the National Forest, revising this statement to a low-to-mid range may be more appropriate. Furthermore, it may be that fire intensity and frequency has also played a role in increasing pine composition within this community - certainly that has been the case in some localized areas and a similar statement to that suggested for the Southern Mesic Slope Forest may be appropriate. Once again, the specific management strategies for this ecosystem detailed on Page 51 may not go far enough to reverse this observed trend toward a greater pine component.

Letter Number 9

Technical, Editorial (123)	Prescribed Burns (136.03)	Ecosystem, Habitat Health (240.01)

Response 9-34:

Appendix B of the revised plan includes a table showing the current and desired percent of ecological systems by unit (Table 14). A section has been added to Appendix C of the revised plan to provide details on vegetation management priorities for each district and ecosystem.

Comment 9-35:

2.3.11 Desired Conditions for Floodplain Forest, Page 20, and 2.3.12 Lower Mississippi River Bottomland and Floodplain Forest, Page 21. Both systems are classified in their respective sections as having"..canopy closure in mature examples of this system being greater than 80 percent."If the intent of these sections entitled "Desired Conditions"in the draft plan is to describe the plan's long term objective for these ecosystems (not describing current conditions), we strongly advise revising the >80% to a range of values such as 70-75% as a desired condition. We refer you to the Lower Mississippi Valley Joint Venture (LMVJV) publication entitled Restoration, Management and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat which provides ample scientific evidence of the increasingly negative impact to native wildlife as forest canopy closure exceeds 80%. Such higher rates of canopy closure frequently result in reduced ground and midstory cover within the forest severely impacting stand diversity and, hence, wildlife habitat productivity (see comments provided later in our review on the same topic). Furthermore, high canopy closure rates (consistently >80%) across large forested tracts for long periods of time frequently result in stand midstories becoming dominated by shade tolerant shrubs and trees. This condition usually is undesirable from a silvicultural and wildlife habitat standpoint. When this condition occurs (and it usually does in these systems given long periods of time in a closed canopy condition), regeneration efforts are generally restricted to extensive use of clear cutting as the only tool available that has a possibility of success. Land managers are essentially relegated to use of this type of silvicultural technique because shade-tolerant species likely would capture any small hole within the canopy. We suggest that modifying stand closure to the recommended levels and implementing treatments/thinning as needed to maintain these levels across stand life will slowly begin to provide other less intensive regeneration opportunities and approaches such as group selection (<2 acre clear cuts) or shelterwoods(two stage regeneration removals). Either approach has distinct, long-term advantages to achieving ecological objectives and retaining stand-wide habitat values.

Letter Number 9

Vegetation Management (141)	Clearings, Canopy (240.0103)

Response 9-35:

We agree that opening canopies and disturbance with thinning are key to establishing and maintaining appropriate advanced regeneration that is important prior to planned regeneration harvests as well as providing for the ability of stands to recover from natural events which destroy canopy cover. The plan states all regeneration in hardwoods will use two aged harvest methods or small clear cut areas. The plan does not emphasize uneven aged regulation and harvest methods, but allows for group selection where it achieves desired conditions for a project area. These were envisioned to be primarily areas with high visual quality expectations where maintaining over story is important. Uneven aged harvest methods were not expected to provide ecological conditions that could not be achieved using even aged thinning and regeneration harvest methods.

Comment 9-36:

2.3.14 Xeric Sandhills, Page 22. This habitat type oft does not contain the fuels to carry a cool season burn we recommend growing season burns to control shrubbery and invasive hardwoods.

Letter Number 9

Prescribed Burns (136.03)

Response 9-36:

The revised plan desired condition for this ecosystem envisions a 1 to 3 year fire return interval with approximately 40 percent occurring during the growing season.

Comment 9-37:

2.3.22 Ephemeral Ponds and Emergent Wetland, Page 27. We recommend seasonally appropriate burns for gopher frog basins, which are typically in the summer when the ponds are dry, and the gopher frogs have dispersed from the site. Additionally, cool season burns could pose negative impacts on this species. There are anecdotal incidences of gopher frog mortality due to inappropriately timed burning that coincided with gopher frog migrations. In addition, tiger salamanders are mentioned as a species found in this habitat, but we have no occurrences.

Letter Number 9

Prescribed Burns (136.03)	Species: TES, etc. (240.03)

Response 9-37:

Section 3.3.2 (Table 5) includes a burn matrix within gopher frog habitat that was developed to minimize effects of prescribed fire.

Comment 9-38:

2.3.23 Cypress-dominated Wetlands, Page 27. These can also be found on the Desoto Ranger District.

Letter Number 9

Technical, Editorial (123)

Response 9-38:

Any Cypress-dominated wetlands found to occur on the De Soto National Forest will be managed in a similar manner consistent with other units on the National Forests in Mississippi.

Comment 9-39:

2.4.1 Threatened and Endangered Species, Page 29. Should also include Graptemys flavimaculata (Yellow-blotched map turtle) Threatened.

Letter Number 9

Species: TES, etc. (240.03)

Response 9-39:

While the yellow-blotched map turtle is known to occur within the Pascagoula River basin, the threatened species is not known to occur on National Forest System lands in Mississippi.

Comment 9-40:

The majority of gopher tortoise nest predation appears to be due to fire ants. Fire ants are much more abundant in under burned or cool season burned habitats where logs and limbs remain abundant on the ground. Metabolic bone disorder is often referred to as the disease issue with gopher tortoises on DNF lands. In Florida, it has been documented that calcium may be tied up in woody shrubs that would be better controlled with warm/hot season burns, such as gallberry, and unavailable to the plants eaten by gopher tortoises or invertebrates eaten by RCWs.

Letter Number 9

Prescribed Burns (136.03)	Insects and Disease Treatment (141.02)	Species: TES, etc. (240.03)

Response 9-40:

The revised plan places an emphasis on the seasonal timing of prescribed fire to accomplish desired conditions.

[Note: Comments 9-41 through 9-45 were combined into a single comment and response and listed as comment 9-42 during review and response to comments.]

Comment 9-42:

2.4.3 Management Indicator Species, Page 31.[...]Second, the exclusive use of red-cockaded woodpecker (RCW) as an indicator species to measure ecological function and plant and animal diversity in pine forests leaves a lot to be desired. Even though it is clearly understood that RCWs must and should be a priority in pine communities, there is a large array of plant and animal species not dependent upon the target habitat conditions for optimum RCW habitat. We suggest consideration be given to utilizing at least one additional species as an indicator in these upland communities.[...]Finally, we strongly suggest adding additional species specific to the hardwood communities and recommend wood duck (Aix sponsa), fox squirrel (Sciurus niger), Swainson's warbler (Limnothlypis swainsonni) and red eyed vireo (Vireo olivaceus). The rationale and thought behind why these species are recommended can be provided if desired. The existing list of indicator species does nothing to track ecological health of the extremely important hardwood forest communities.[...]Largemouth bass (Micropterus salmoides) may indeed be a useful indicator for lentic systems on Forest Service property managed for recreational sport fishing. We cannot recommend largemouth bass as an adequate indicator for aquatic systems managed with biodiversity or natural ecosystem function in mind, especially for lotic systems. Largemouth bass are primarily lentic species that can adapt well to lotic environments and exhibits a broad and very adaptive diet. For these reasons, largemouth bass population trends could fail to indicate large shifts in the ecology of aquatic systems resulting from various practices. MDWFP's State Wildlife Action Plan (SWAP), formerly known as Comprehensive Wildlife Conservation Strategy (CWCS), provides a list of species (not all of which are considered rare) sensitive to many factors known to negatively impact biodiversity and natural ecosystem function (e.g., siltation, increased turbidity, increased nutrient loads, and altered hydrology). It is our recommendation that the Forest Service consult the MDWFP and/or the SWAP (CWCS) document to identify fishes that better serve as indicators of healthy biodiversity and natural ecosystem function relative to largemouth bass. The document in its current published form is available at:

www.mdwfp.com/media/63792/cwcs.pdf.[...]3.3.4 Management Indicator Species, Page 62. See previous comment concerning indicator species.

Letter Number 9

Monitoring (130.01)	Ecosystem, Habitat Health (240.01)	Indicator Species (243.02)

Response 9-42:

Thank you for your comment on selection of Management Indicator Species. Appendix F of the final environmental impact statement documents the process and rational used in selection of the management indicator species for the revised plan.

Comment 9-46:

2.7.1 Roads, Page 37. We recommend treating invasive species along USFS road corridors as soon as they are detected.[...]2.7.2 Trails, Page 38. See previous comment under Roads.

Letter Number 9

Invasive Animal Species (243.03)

Response 9-46:

We concur with your recommendation but often find that limited resource contributes to delay in treatments.

Comment 9-47:

3.2.3 Loblolly Pine Forest, Page 46, Last Sentence. The last sentence states "Other communities such as upland hardwoods and mesic slope forests will also be converted from loblolly sites as well."We endorse this change or conversion but are troubled that the following page lists no target objective for this change by ecological system type and ranger district. Please provide such a planning target in the objectives. In addition, the objectives for the loblolly pine forest state that all acreage (351,000) "..of this fire-dependent ecosystem have received a fire return interval of 1 to 4 years..."Successful conversion to upland hardwood/mesic slope mixed species hardwoods will likely, in some cases, require at least some modification in the normal burn regime proposed in both frequency and intensity. Reduced short-term burn frequency for 10- 20 years during and following conversion actions and long term modification to reduce burn intensity will be important to maintaining this hardwood community and selecting against greater pine component. Please see Page 19 of the draft plan and our comments on this subject above. It is doubtful that the upland mesic hardwood forest, in its purest form, can be classed as fire dependent, the classification given on Page 47 for the entire loblolly pine ecosystem.

Letter Number 9

Prescribed Burns (136.03)	Ecosystem, Habitat Health (240.01)

Response 9-47:

The priority placed on restoration of longleaf and shortleaf and improvement of endangered species habitat does not allow for this to be emphasized in the first decade of plan implementation. However, some may occur. See the description of priorities for management activities added to Appendix C of the plan.

Comment: 9-48

2.9 Minerals Management, Page 42. We recommend including contingency measures for emergency spill situations.

Letter Number 9

Oil & Gas (135.02)

Response 9-48:

Development of emergency contingency plans is a standard operating procedure for our minerals management program execution. The revised plan generally does not restate agency policy, manual or handbook direction.

Comment 9-49:

3.2 Upland Longleaf Pine Forest and Woodland, Page 44-45. Key characteristics of upland longleaf were referenced including "abundance, fire regime, canopy structure, and tree age diversity," however, the document did not emphasize the management regime to sustain canopy structure and tree age diversity, especially regarding role of regeneration strategy and management.

Letter Number 9

Timber Management (142)	Clearings, Canopy (240.0103)

Response 9-49:

Appendix C of the plan now includes a section addressing silvicultural systems and cultural practices by ecosystems.

Comment 9-50:

It is stated that of the acreage suitable for the longleaf pine ecosystem (251,000 ac), it is burned on a 1 - 4 year rotation with 40% of the burns conducted in the growing season. A combination of dormant season and growing season burns may be beneficial to manage longleaf pine and wildlife habitat. A patchwork of growing season burns can eliminate encroaching woody vegetation, and promote openings, grasses, and forbs, which support some wildlife associates. The current plan may want to consider including prescribed fire as one of the highest priorities of managing upland pine forests along with "restoration of longleaf pine" to achieve its restoration to a functioning "ecological system." Fire may be just as critical to restoration as establishment, since the two are usually not mutually exclusive of one another in natural history.

Letter Number 9

Prescribed Burns (136.03)

Response 9-50:

Agree, fire is the most important management technique (tool) in the establishment and maintenance of the longleaf pine ecosystem. See also, Appendix C of the plan.

Comment 9-51:

An understory restoration strategy may also be appropriate in developing the longleaf ecological system. We recommend specifying an understory vegetation monitoring and understory restoration strategy. Furthermore, we recommend including the identification and control of invasive species in this section of the plan.

Letter Number 9

Vegetation Management (141)

Response 9-51:

Control of invasive species is addressed in section 4.2.5 of the revised plan. Chapter 5 of the revised plan contains the monitoring and evaluation program strategies which includes understory vegetation conditions and trends.

Comment 9-52:

It is stated that "maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system..."a statement that reflects either all aged management in even aged units, or an uneven aged management regime, which mimics the natural growth pattern of longleaf pine and can meet objective of providing wildlife habitat. Meeting objectives for timber and wildlife in longleaf pine stands may include thinning stands every 6 - 10 years with basal areas between 40 and 70 sq. ft. per acre, depending on targeted wildlife species.

Letter Number 9

Technical, Editorial (123)	Vegetation Management (141)

Response 9-52:

More frequent entry for timber sales may be ideal, but is not logistically possible with the Forest Service's likely program levels. Also 40 to 70 square feet of basal area is low enough overstory density that if practiced on more than a limited basis on xeric sites would lead to understory proliferation which would not be controlled with the fire return interval capability of likely program levels. In addition, such low density management is not capable of supporting the frequent thinning entries suggested except to remove loblolly in-growth.

[Note: Comments 9-53 through 9-56 were dropped during review and response to comments.]

Comment 9-57:

3.2.5 Slash Pine Forest, Page 48, Last Sentence. The last sentence of this section states .."we have identified slash pine as a candidate for regeneration to shortleaf pine-oak or hardwood ecological systems...."As in the comment above, we suggest that target objectives for the conversion be provided in acres by ecological-system type and by ranger district.

Letter Number 9

Technical, Editorial (123)

Response 9-57:

For the Yalobusha Unit, the occurrence is a few hundred acres. So, the intent is 100% conversion to shortleaf pine-oak or hardwood ecological systems. The few acres of slash occurring on this unit were lumped with loblolly for modeling purposes.

Comment 9-58:

3.2.12 Lower Mississippi River Bottomland and Floodplain Forest, Page 52, Line5. Repeated references are made throughout Section 3.2 to 'closed canopy' hardwood forests as a positive stand attribute for wildlife habitat production. If the intent of this statement is to describe a forest stand where the canopy exists at a level that provides closure due to density (for example, canopy cover of the overstory consistently greater than 80 percent or basal areas consistently greater than 80 square feet), we strongly disagree that this condition is conducive to desired conditions for most species of native wildlife (game and nongame) that inhabit these systems. Briefly, a closed canopy severely limits sunlight penetration greatly restricting both quantity and quality of ground, understory and midstory vegetation. Frequently, such stands exhibit open, park-like understory with little internal, horizontal or vertical diversity which severely limits wildlife habitat productivity for most all species. The science is very clear. Open, park-like conditions resulting from a uniformly closed overstory canopy severely restricts wildlife habitat productivity, including recruitment from nesting/foraging forest birds that utilize these canopy layers for their life cycle to utilization by game species such as deer and turkeys. Secondly, closed canopy hardwood forests tend to develop significant stocking of shade tolerant shrubs and trees which dominate the midstory. The shade tolerants can develop to the point that they immediately capture any gap which occurs, thereby significantly impacting future management options along with lowering species diversity. If the intent of this statement in these sections is a reference instead to a fully stocked stand (in comparison to low stocking rates associated with an RCW cluster site, for example), then please provide stocking rates intended and other canopy closure measures. Otherwise, it is suggested that such statements be deleted from the document as a desired condition of the hardwood forests in Mississippi. The draft plan stipulates that the Forest Service strategies for sustaining species diversity include providing ecological conditions that 'support a diversity of native plant and animal species over the long term (Page 57, Paragraph 4). A uniformly closed- canopy forest is counterproductive to this objective and could negate achieving many of the long-term objectives. Also, see previous comment concerning this subject provided in item 5.

Letter Number 9

Technical, Editorial (123)	Clearings, Canopy (240.0103)

Response 9-58:

The desired condition for dry upland hardwoods was written into the draft plan to reflect what we expected to be able to accomplish with likely resources. The desired condition of dry upland hardwood has been edited to state that it will contain some open canopy conditions. In addition, oak species composition for northern dry upland hardwoods has been edited to substitute black and scarlet oak for white oak. Chapter 3 of the revised plan has a stated objective for the first decade to reduce the density of 1700 acres of dry upland hardwood and restore dry upland hardwood on 1600 acres from the loblolly forest type. These activities result in a relatively small percentage increase in acreage of dry upland hardwoods and open canopy conditions.

The interdisciplinary team developing the plan was concerned that areas opened with overstory reductions to woodland conditions in dry upland hardwoods would be difficult to maintain with fire return intervals likely to be achieved. The revised plan gives higher priority to threatened and endangered species habitat,

and restoration of longleaf which supports many of the threatened and endangered species occurring on the Forest. A section has been added to Appendix C to provide details on the vegetation management priorities for each district.

Comment 9-59:

3.2.9 Southern Mesic Slope Forest, Page 50. A 1 to 6 year burn plan for Southern Mesic Slope Forest may be too frequent. A 6 to 20 year interval based on fuel conditions is more favorable. In addition, fire should not be pushed into the slope.

Letter Number 9

Prescribed Burns (136.03)

Response 9-59:

Prescribed fire strategy is low-intensity fire that may creep into this system from surrounding upland communities.

Comment 9-60:

3.2.11 Floodplain Forest, Page 52, Line 8. Line 8 states "Natural processes will contribute significantly to attaining the desired conditions within this system...." Please explain what is meant by this statement. In the absence of unusually high stem mortality, un-thinned, mature hardwood forests tend to develop closed-canopy, park-like conditions that typically provide relatively limited internal stand diversity. Consequently, these stands exhibit low-to-poor wildlife habitat values for most all species. Also, see previous comment on this subject.

Letter Number 9

Wildlife/Animals Management (143)

Response 9-60:

This statement reflects the fact that planned management in Floodplain hardwood will be fairly limited due to funding and staff constraints. Restoration of shortleaf, longleaf, rare community types, and threatened and endangered species habitat needs will have a higher priority. A consideration in this also was that this system, in the southern part of the state, has recently been significantly disturbed by hurricane Katrina. The Holly Springs and Tombigbee have floodplain hardwood harvest outcomes projected in the plan however, natural process and events will likely have greater influence on these floodplain forests than planned harvests.

Comment 9-61:

3.2.11 Floodplain Forest, Page 52, Objective Bullet 3. The third objective bullet states "approximately 600 acres of floodplain forest have reduced overstory density and a species composition shifted toward desired characteristic species for this ecological system ...." Please describe what constitutes these desired characteristic species for this ecosystem.

Letter Number 9

Technical, Editorial (123)

Response 9-61:

These are silvicultural thinning applications to promote advanced regeneration of desirable species which provide early serial components necessary to sustain the ecosystem over time.

Comment 9-62:

The fourth bullet objective states "Approximately 1,300 acres of the 97,000 total acres of floodplain forest are in the 0- to 10-year age class ... and approximately 88,000 acres are in mature forest condition (60 years or older)."These statistics indicate little, if any, planned thinning or stand silvicultural treatments other than 2-stage regeneration cuts (if we understand the intent correctly). If this is the planned management approach, we respectively submit that optimum wildlife habitat productivity will not be achieved on these forests other than minimum amounts of primary habitat on 1-2% of the ecosystem ownership. The math is simple- 90% of the ecosystem in Forest Service ownership will exist as closed-canopy stands providing significantly lowered habitat productivity across the planning period. It is imperative that Forest Service staff consider intermediate thinning (contingent upon crown closure variables and multiple other stand attributes and agency objectives at that time, of course) across the life of the stand in order to create and maintain internal stand structure provided by multi-tier canopies and abundant ground cover.

Letter Number 9

Clearings, Canopy (240.0103)

Response 9-62:

Vegetation treatment priority information has been added to Appendix C of the plan. We concur that more disturbances in floodplain hardwood with thinning activities would be beneficial. The floodplain forest system is projected to have 600 acres of thinning in the first decade on the Holly Springs and Tombigbee National Forests. Plan projections are based upon anticipated funding and staffing levels, other higher priority treatments, as described in Appendix C of the plan, preclude scheduling of additional treatments in this system.

Comment 9-63:

The draft plan repeatedly states objectives to support a diversity of native plant and animal species focusing on "restoring composition, structure and relative abundance"(Page 57). Without periodic disturbance (10-20 year intervals) associated with low-intensity thinning throughout the life of the stands, most areas will offer little intrinsic habitat value for many native species. As stated previously, the science is clear. The Forest Service is referred, once again, to the LMVJV document which summarizes and provides adequate peer-reviewed reference material. The Forest Service in Mississippi has a unique opportunity in development of this new plan to incorporate current, state-of-the-art forest management approaches that will significantly enhance wildlife habitat productivity throughout the hardwood ecosystem in its ownership. We are suggesting consideration of approaches that will achieve these objectives. What is being suggested is not maximizing or skewing the draft plan to a wildlife habitat management plan[...]We fully understand that the Forest Service does not singularly manage for wildlife. The MDWFP, however, as the state's principle wildlife agency, has the responsibility to request that other public land managing agencies consider the best science and sound habitat management practices that optimize wildlife outputs from lands within state boundaries contingent upon agencies' mandates and policies. The above and similar comments are offered in that light.[...]3.2.12 Lower Mississippi River Bottomland and Floodplain Forest, Page 52, Line 5. This line states "Mature closed-canopy hardwood forests....See previous comment.

Letter Number 9

Coordination, Consultation (110.02)	Vegetation Management (141)	Disturbance Regimes (240.0101)

Response 9-63:

The desired condition and management strategies for floodplain forest were written in the draft plan to reflect what we expected to be able to accomplish with likely resources. The revised plan gives higher priority to threatened and endangered species habitat, and restoration of longleaf which supports many of the threatened and endangered species occurring on the Forest. A section has been added to Appendix C to provide details on the vegetation management priorities for each district. A guideline was also added to Section 4.2.1 of the revised plan that promotes enhanced wildlife habitat productivity in hardwood dominated ecosystems.

Comment 9-64:

Line 10. This line states, in part "...condition, and low intensity fires may be utilized to accomplish ecosystem objectives....'Please explain this statement. Other than use of fire as a site prep in a clearcut, controlling invasive species, or maintenance of a unique community, it is unclear what positive role fire would play in MAV hardwood ecosystem management. In contrast, it is very clear what negative impacts could occur if applied at stand-level scale.

Letter Number 9

Technical, Editorial (123)	Prescribed Burns (136.03)

Response 9-64:

The intent was to allow for fire use in lower Mississippi River bottomland and floodplain forest regeneration or in vine dominated areas after mechanical or herbicide treatment. This would depend upon project specific conditions; the plan would permit, but does not prescribe or project this level of detail at the forest plan level.

Comment 9-65:

3.2.12 Lower Mississippi River Bottomland and Floodplain Forest, Page 53, Objective Bullet 3. This bullet states "Approximately 6,500 acres...have improved species composition..."We assume this 6,500 acres across the plan's 15-year life (roughly 400 acres per year) reflects periodic management treatments/thinning for stand and habitat improvements. If the 6,500 acres reflect periodic treatments, we suggest this acreage be increased to about 15,000 acres across the plan's life expectancy (contingent upon individual stand conditions and other plan requirements, of course). We, once again, refer the Forest Service to the LMVJV document referenced above which enumerates ecologically-based, habitat-driven, sustainable management strategies for floodplain hardwoods reflecting many decades of highly-successful efforts across hundreds of thousands of acres of state- and federally-owned bottomland hardwood forestland.

Letter Number 9

Coordination, Consultation (110.02)

Response 9-65:

The 6,500 acres is the first decade total or 650 acres per year. Thinning of 15,000 acres in lower Mississippi River bottom and floodplain forest would be better, however this is not a priority for use of our

limited timber sale capability (see the vegetation treatment priority information added to Appendix C of the plan).

[Note: Comment 9-66 was eliminated during review and response to comments.]

Comment 9-67:

3.7.1 Recreation, Page 75, First Line.[...]The first line states that "Where appropriate, additional access for hunters by seasonally opening some routes on the National Forests in Mississippi will also be considered[...]The off-road use of OHVs to retrieve harvested animals, such as deer and hogs, is necessary to encourage the harvest of these animals. The regulated harvest of deer provides the only effective means of controlling populations, ideally, at or below the carrying capacity of the forest habitat. The MDWFP's experience with managing public lands has demonstrated that hunters are significantly more likely to harvest deer if they can more easily transport the animal after harvest. Likewise, hunters are more apt to harvest hogs when motorized transportation is available for retrieval of these[...]For obvious reasons, the control or eradication of nuisance hogs should be a key objective to any management plan for Forest Service lands. Based upon our experience, off -road use of OHVs for retrieval of deer and hogs has not caused any adverse impacts to wildlife or other natural resources on wildlife management areas managed by the MDWFP because such retrieval is (1) low in frequency- only occasional to rare, (2) usually not concentrated to the same sites, (3) not occurring during the time of year when most wildlife species are raising their young, and (4) used in a utilitarian manner that minimizes impacts to the resources. This type of use is minimally invasive compared to traditional, recreational uses of OHVs.

Letter Number 9

Seasonal Closures/Access (162.02)	OHV use (164.01)

Response 9-67:

The National Forests in Mississippi follows the National Roads Policy guidance for management of National Forest System roads and trails. The policy allows for an exception for large game retrieval which the forest utilizes, the revised plan does not affect or change National Roads Policy direction.

Comment 9-68:

While we endorse the limited and infrequent off-road or off-trail use of OHVs for deer and hog retrieval by hunters, we recommend that all other OHV use be limited to designated gated roads or trails specified and developed for use by OHVs. The use of OHVs for outdoor recreation in this state has increased in popularity in the past decade. We recognize that the Forest Service tries to accommodate the request for recreational use of OHVs and balance that use with the obligation to protect and conserve wildlife resources[...]Some of the problems inherent in allowing unrestricted, off-road use of OHVs include the following: (1) resource damage to sensitive soil types such as those susceptible to rutting in wetter, bottomland sites, (2) soil disturbance which could increase the levels of siltation into adjacent waterways and contribute to higher levels of turbidity, negatively affecting the biological health of aquatic systems, (3) damage to rare, threatened or endangered plant communities, (4) direct disturbance to wildlife and the accompanying noise pollution which can displace wildlife in certain circumstances, (5) use of OHVs to facilitate the illegal taking of wildlife, (6) difficulty of enforcing regulatory compliance and adherence to wildlife regulations because of motorized access, and (7) increased litter and dumping of potentially harmful debris.[...]However, the general[...]Forest Service lands is not compatible with the best interests of the wildlife resources on those lands.[...]unrestricted[...]resource damage to sensitive soil types such as those susceptible to rutting in wetter, bottomland sites, (2) soil disturbance which could increase the levels

of siltation into adjacent waterways and contribute to higher levels of turbidity, negatively affecting the biological health of aquatic systems, (3) damage to rare, threatened or endangered plant communities, (4) direct disturbance to wildlife and the accompanying noise pollution which can displace wildlife in certain circumstances, (5) use of OHVs to facilitate the illegal taking of wildlife, (6) difficulty of enforcing regulatory compliance and adherence to wildlife regulations because of motorized access, and (7) increased litter and dumping of potentially harmful debris.[comment end]

Letter Number 9

Seasonal Closures/Access (162.02)	OHV use (164.01)

Response 9-68:

The National Forests in Mississippi follows the National Roads Policy guidance for management of National Forest System roads and trails. The policy allows for an exception for large game retrieval which the forest utilizes, the revised plan does not affect or change National Roads Policy direction. The roads policy limits off-highway vehicle use to designated trails and areas only.

Comment 9-69:

The off-road use of OHVs to retrieve harvested animals, such as deer and hogs, is necessary to encourage the harvest of these animals. The regulated harvest of deer provides the only effective means of controlling populations, ideally, at or below the carrying capacity of the forest habitat. The MDWFP's experience with managing public lands has demonstrated that hunters are significantly more likely to harvest deer if they can more easily transport the animal after harvest. Likewise, hunters are more apt to harvest hogs when motorized transportation is available for retrieval of these animals. For obvious reasons, the control or eradication of nuisance hogs should be a key objective to any management plan for Forest Service lands. Based upon our experience, off -road use of OHVs for retrieval of deer and hogs has not caused any adverse impacts to wildlife or other natural resources on wildlife management areas managed by the MDWFP because such retrieval is (1) low in frequency- only occasional to rare, (2) usually not concentrated to the same sites, (3) not occurring during the time of year when most wildlife species are raising their young, and (4) used in a utilitarian manner that minimizes impacts to the resources. This type of use is minimally invasive compared to traditional, recreational uses of OHVs.

Letter Number 9

Seasonal Closures/Access (162.02)	OHV use (164.01)

Response 9-69:

Duplicate comment - See response to Comment 9-68:

Comment 9-70:

Line 5 states that 'Generally, hardwood regeneration harvests will not be made prior to age 90.'We encourage the Forest Service staff to consider routinely incorporating group selection holes (tree removals < 2 acres) in all treatments/thinning where stand conditions permit the application of this less obstructive technique. Implementation of such an approach has proven highly successful in obtaining desired regeneration, including shade-intolerant red oaks, on many thousands of acres of public land across the MAV. Such approach also avoids the long- term, negative impacts associated with a larger clear cut area losing habitat productivity for long periods of time following canopy closure.[...]4.2.1 Vegetation, Wildlife, and Fisheries, Page 82, Guideline 3. See previous comments above. 4.2.1 Vegetation, Wildlife, and Fisheries, Page 83, Guideline 8.DSee previous comments above.

Letter Number 9

Harvest Methods (142.04)

Response 9-70:

The plan does not emphasize uneven aged regulation and harvest methods, but allows for group selection where it achieves desired conditions for a project area. These were envisioned to be primarily areas with high visual quality expectations where maintaining over story is important. Uneven aged harvest methods were not expected to provide ecological conditions that could not be achieved using even aged thinning and harvest methods. However, the silvicultural treatment descriptions added to plan Appendix C describe thinning in floodplain and bottomland hardwood to include gap creation. Gaps are described to be the openings created by removal of one to several dominant trees in the canopy. Please note Vegetation, Wildlife and Fisheries standard number 3 states the legal limitation on regeneration area size.

Comment 9-71:

4.2.1 Vegetation, Wildlife, and Fisheries, Page 83, Guideline 19. When referencing planting wildlife food plots, we recommend emphasizing native vegetation management as opposed to, or in conjunction with planting food plots. Especially in the typical low quality soil of the longleaf forest, food plot plantings could be a big expense. Prescribed fire and disking has proven to promote native vegetation in the understory that is just as beneficial, or more so, than a food plot planting. Furthermore, large food plots may concentrate predators, which could be negative on some wildlife populations, such as northern bobwhite quail. Periodic thinning's, a carefully planned fire regime, and disking in the appropriate season to promote native grasses and forbs for cover and forage, have proven to be beneficial for wildlife.

Letter Number 9

Wildlife Structures (143.06)

Response 9-71:

Plan guidelines in Chapter 4 specify use of native or noninvasive nonnative species when seeding openings.

Comment 9-72:

4.2.1 Vegetation, Wildlife, and Fisheries, Page 83, Guideline 32. To insure that only certified triploid grass carp are stocked, all grass carp vendors should be asked if they participate in the USFWS Grass Carp Certification Program or if they obtain their grass carp from suppliers that participate in this program. Without the receiving receipt of a USFWS triploid grass carp certification statement for each grass carp shipment that the USFS receives, it cannot stated that only certified grass carp were stocked. Many fish producers in Mississippi are selling triploid grass carp, but only one actually has USFWS triploid certification statements for the fish they sell. Fish eggs may be subjected to methods (pressure and temperature shock) that are known to induce triploidy but usually a percentage of such offspring (5-30%) are determined to be diploid through ploidy testing.

Letter Number 9

Fishing (165.04)

Response 9-72:

Thank you for your comment your concern is noted and addressed in Guidelines for Vegetation, Wildlife, and Fisheries (number 36).

Comment 9-73:

4.2.4 Fire, Page 88, Guideline 5. We suggest that alluvial sites of significant size (perhaps> 40 acres) be excluded, where possible, modifying burn unit configurations except as noted in the last line of this item; or only included burn units when fuel conditions will not permit intense fires.

Letter Number 9

Prescribed Burns (136.03)

Response 9-73:

Prescribed fire guidelines limit fire intensity for these areas and also encourage use of existing barriers to reduce the need for fire line construction and minimize resource impacts.

Comment 9-74:

4.2.5 Invasive Species, Page 89. Guidelines for Invasive Species practices should include cleaning tools and vehicles before and after use in natural areas. We recommend including a section to address the impacts of wild hog damage to native wildlife habitats within National Forests. The impacts from wild hog damage on Mississippi's National Forests and consequently, some MDWFP WMAs, are of concern. There is opportunity for a cooperative plan between the USFS and the MDWFP to work collectively to reduce wild hog damage on National Forests that contain MDWFP WMAs. Regardless, the MDWFP suggests that wild hog impacts on wildlife habitats should be addressed within National Forests in Mississippi. Wild hog populations continue to increase at alarming rates statewide. Wild hog populations are threatening native wildlife habitats, timber, agriculture, water quality, roads, and levees not only in Mississippi, but all across the United States. Wild hogs are not native to North America and are classified as a 'nuisance animal' in Mississippi by state statute. Wild hog populations can naturally expand rapidly due to their prolific reproductive potential, adaptability to survive in virtually any type of habitat, and lack of natural predators. Populations have un-naturally expanded throughout the United States by illegal transportation and release into the wild by people who regard them for sport hunting more so than their potential to damage natural resources. Due to the severity of problems created by wild hog population the MDWFP initiated wild hog trapping and removal efforts on all state-owned WMAs to reduce damage caused to wildlife habitats in 2012.

Letter Number 9

Invasive Animal Management (143.03)

Response 9-74:

Impacts from wild hogs are addressed in the final environmental impact statement in sections 3.5.6 and 4.10.1. The final plan has guidelines that address invasive species, which include wild hogs, are found in plan section 4.2.5, specifically guidelines 7, 8, and 9.

Comment 9-75:

5.3.1 Monitoring Questions and Performance Measures, Page 112, Table 12, B.3. The performance measures for the question 'Are species diversity and game abundance supporting nature viewing and

quality hunting opportunities?"are listed as Wildlife Census, Statewide game population estimates, and Visitor use monitoring. We recommend changing the three performance measurement. Completing a wildlife census on free-ranging wildlife populations is all but impossible. We recommend using Wildlife Surveys. Additionally, statewide game population estimates may not be indicative of game populations on National Forest lands, especially when there are no harvest estimates for these areas. We recommend site-specific estimates and monitoring implemented within each National Forest unit. Additionally, more detail is needed on the visitor use monitoring to determine "quality hunting opportunities."

Letter Number 9

Monitoring (130.01)

Response 9-75:

We concur that site-specific estimates and monitoring specific to each unit would provide a higher resolution and a more accurate assessment of population trends, however anticipated staffing and budget levels limit our ability to monitor wildlife populations at the suggested resolution. This monitoring element relies on utilizing the best information available without collection of additional field level data.

Comment 10-1:

The Department of the Interior (Department) has reviewed the Draft Environmental Impact Statement (DEIS) for US Forest Service (USFS), Revised Land and Resource Management Plan for the National Forests in Mississippi. We have no comments at this time.

Letter Number 10

No Further Response Required (102)

Response 10-1:

No response required.

Comment: 11-1

1. We support the restoration of the ecological function in the longleaf pine ecosystem and agree with restoring this system initially by transitioning to "high-function loblolly and slash pine phases." In many cases, thinning can be used, existing longleaf can be left in place, fire introduced, and ecological function can be achieved without the ground- and soil-disturbing effects of clear-cutting and re-planting.

Letter Number 11

Environmental Quality and Ecosystem Integrity (230.01)	Ecosystem, Habitat Health (240.01)

Response 11-1:

The plan objectives stated in Sections 3.2.3 and 3.2.5 recognize ecosystem restoration is a long-term commitment that may take decades to achieve and existing "off-site" species should be managed towards achievement of desired conditions in incremental phases where appropriate.

Comment 11-2:

2. We support the initiative to focus on inventory and restoration of ephemeral ponds and protection of stumps and stump holes.

Letter Number 11

Ecosystem, Habitat Health (240.01)

Response 11-2:

Thank you for your comment.

Comment 11-3:

3. Through-out the revised plan and associated documents, the common name of the Mississippi gopher frog needs to be changed to: dusky gopher frog and scientific name to: Rana sevosa.

Letter Number 11

Technical, Editorial (123)

Response 11-3:

Suggestion incorporated into all planning documents.

Comment 11-4:

4. Feral hogs have the potential to degrade habitat and destroy plant populations, such as those of the federally endangered Louisiana quillwort, and should be addressed in this Plan.

Letter Number 11

Invasive Animal Management (143.03)	Species: TES, etc. (240.03)

Response 11-4:

Feral hogs were addressed in the Final Environmental Impact Statement (Section 3.5.6). Non- native invasive species management guidelines (Section 4.2.5 Land and Resource Management Plan) were developed with this species in mind.

Comment 11-5:

5. Forest Sensitive Species- We recommend that the Plan discuss non-federally listed rare species found in the National Forests of Mississippi such as the Camp Shelby Burrowing Crayfish or the Black Pine Snake. Again, staff in the Mississippi Field Office can assist in identifying these species of concern.

Letter Number 11

Species: TES, etc. (240.03)

Response 11-5:

Sensitive species were addressed in Section 3.3 of the Forest Plan and several guidelines in Chapter 4 of the plan were developed to address sensitive species. These species were also addressed in Sections 4.6, 4.7, and 4.8 of the Final Environmental Impact Statement (see also Appendix G and H of the Final Environmental Impact Statement).

Comment 11-6:

6. In April of 2013, there was a confirmed sighting of the endangered Indiana Bat (Myotis soda/is) on the Holly Springs National Forest. We recommend the Plan be updated to include this new species.

Letter Number 11

Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-6:

The endangered Indiana Bat has been included in the final analysis and planning documents.

Comment 11-7:

1. p. 14: The "Desired Conditions for Upland Longleaf Pine Forests and Woodlands" includes the statement, "fire occurs at an interval of 1 to 3 years with approximately 40% of fires occurring in the growing season." However, on p. 45 under "Objectives for Upland Longleaf Pine Forests and Woodlands," there is the statement that "The estimated 251,000 acres of this fire-dependent ecosystem have received a prescribed burn return interval of 1 to 4 years, with approximately 40% of the burns conducted in the growing season for the first decade." We would like to see the Objectives match the Desired Conditions of burning every 1 to 3 years.

Letter Number 11

Prescribed Burns (136.03)

Response 11-7:

Plan objectives are stepping stones of achievement that move the National Forests in Mississippi toward the desired conditions. Objectives are strongly influenced by recent trends, past experiences, current staffing levels, and anticipated near-term budgets. The plan objectives reflect (what we believe are) realistic expectations that are planned to occur during the current planning cycle (next 10-15 years). The desired condition statement reflects our aspirations for the long-term.

Comment 11-8:

2. p. 14: In the box describing desired conditions for this forest type, fire frequency was described with 40% of fires occurring "in the growing season." For clarity, please define "growing season."

Letter Number 11

Technical, Editorial (123)

Response: 11-8

Growing season is defined as generally during the time period of leaf expansion to leaf off of deciduous tree species. Growing seasons vary depending upon local climate and geography. See growing-season burn in the glossary of the Forest Plan.

Comment 11-9:

3. p. 30, first paragraph: Dusky gopher frog populations may be stagnant to declining; however, you may want to mention the use of the newly restored pond (Pony Ranch Pond) as a new breeding site. In

addition, I would say that the Mississippi sandhill crane population is slowly decreasing rather than increasing.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-9:

Thank you for your comment. This comment has been incorporated into the paragraph.

Comment 11-10:

4. p. 30: The statement that "Louisiana quillwort populations are increasing and new populations are found regularly"needs to have some sort of documentation or citation to substantiate this claim. Also, how is a determination made that a site is actually a new population and not a natural expansion of an existing population?

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-10:

Statement was changed to: "National Forests in Mississippi are now known to be home to more Louisiana quillwort populations than anywhere else in the species' range."

Comment 11-11:

5. p. 30: The statement that "Pondberry appears to have stable populations, but they are not increasing" has no data or authorities cited to substantiate this claim. Our information indicates a decline in the USPS populations.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-11:

National Forests in Mississippi utilized data from a 2001 study. We appreciate the additional data provided by your office which has been incorporated into the final documents.

Comment 11-12:

6. p. 58, first paragraph: Critical habitat was designated for the dusky gopher frog on June 12,2012. This might be a good place in the revised plan to mention that critical habitat areas have been designated on the De Soto National Forest (DNF). Shape files, clipped to just include the DNF areas, are attached. There are four areas within DNF that are designated critical habitat. These areas include habitat around the Glen's Pond and other associated ponds, habitat around Carr Bridge Road Pond, habitat around the Ashe Nursery ponds, and habitat around three ponds in the Mars Hill area of Perry County. One cooperative management unit has been created for the dusky gopher frog using a 2 km intersect with stands in the area of Glen's Pond. We do not have the shape files for this CMU, but based on our

approximation, it appears it does not include the complete critical habitat unit around Glen's Pond. We would like to see CMUs for all of the areas designated as critical habitat; however, we understand that this may not be possible prior to finalizing the revised plan.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-12:

Critical habitat has been included in this section. There are 7 areas on the De Soto Ranger District. One conservation management unit (CMU) was created surrounding Glen's Pond to emphasize the importance of the original and primary breeding pond and provides a focus point. National Forests in Mississippi habitat management for this species and others emphasizes continuity of habitat across the landscape to preclude isolation and allow for dispersal of the species across the landscape as have been seen with the established breeding meta-population at Pony Ranch Pond. Management of critical habitat remains a priority to the Forest. National Forests in Mississippi would support the establishment of habitat management areas or conservation management units for the dusky frog within the recovery plan.

Comment 11-13:

7. p. 61, first paragraph under this section, second sentence: A memorandum of understanding (MOU) between the Forest Service, the Fish and Wildlife Service, and the Mississippi Department of Wildlife Fish (sic) (should be Fisheries) and Parks is mentioned as a guiding document in the management strategy for the frog on the DNF. However, we cannot find a signed MOU between these parties and do not believe such

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-13:

The original memorandum of understanding (MOU) was signed in 2007. A copy has been forwarded to your office for your records. The memorandum of understanding is being revised and renewed by all parties as the five year term for the original document has recently expired.

Comment 11-14:

8. p. 61, first paragraph under this section, fourth sentence: In 2013, dusky gopher frogs bred at Pony Ranch Pond. These frogs are part of the Glen's Pond population, but this new site indicates the beginnings of the establishment of a meta-population which was the intent of the management that has been on-going by the Forest Service on DNF.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-14:

Clarification statement has been incorporated into the final document.

Comment 11-15:

9. p. 62, burn matrix, Table 5: At a gopher frog recovery meeting held in July of 2009, the burn matrix from 2008, as presented on this page, was updated. A pdf of this updated matrix is attached.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-15:

This burn matrix has been modified to adhere to the 2009 burn matrix and also modified to be implemented in areas rather than solely at Glen's Pond.

Comment 11-16:

10. p. 85: There are specific recommendations for maintaining buffers around RCW colonies and black bear den sites. However, we could not find any conservation measures for activities near gopher tortoise burrows. The only mention was a blanket statement to 'follow the habitat management strategies found in the most current USDI Fish and Wildlife Service Recovery Plan for each threatened and endangered species.' We would like to see mention of the recommendation that a 25-foot buffer will be maintained around all known gopher tortoise burrows when utilizing heavy machinery.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-16:

Your recommendation has been incorporated into the final document, section 3.2.1 standard number 10.

Comment 11-17:

11. p. 71, Initial discussion under frog: This would be an appropriate place to have a more in depth description of the critical habitat designated on the DNF.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-17:

A description of the critical habitat designated on the De Soto National Forest has been added to the final documents.

Comment 11-18:

12. p. 72, Mississippi gopher frog responses to threats. Third paragraph, last sentence: Add 'growing season' to sentence describing burning regime. Fourth paragraph: MOU is mentioned again. We are not aware of a signed MOU regarding dusky gopher frog management on the DNF. Fifth, sixth, and seventh paragraph: These paragraphs are duplicates of the first three paragraphs under the dusky gopher frog section.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-18:

Your suggested edits have been incorporated into the final document. See also response to comment 11-13 regarding memorandum of understanding.

Comment 11-19:

13. p. 73, first paragraph: After second sentence, suggest adding something similar to this: "In 2013, a pond recently restored by the Forest Service and less than a mile from Glen's Pond was used as a breeding site."Also, a discussion of a management focus in the other 3 areas of critical habitat would fit here.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-19:

This information has been incorporated into the final documents.

Comment: 11-20

14. p. 73, Figure 10, CMU: The legend in this figure is not readable. The map in the figure would benefit from the addition of the CH units on the DNF.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-20:

The map has been updated in the final documents.

Comment 11-21:

15. p. 74, Mississippi Sandhill Crane Current Threats: Amend the third sentence and add an additional sentence to this paragraph as follows: "The wild flock has been slow to increase due to abnormally high mortality of nestlings and first-year birds. Population stability has been achieved only through the release of captive-bred chicks."

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-21:

Suggested edits have been incorporated into the final documents.

Comment 11-22:

16. pp. 83-84, Pallid Sturgeon. Pallid sturgeon is no longer considered"...one of the rarest fish in North America."During the past decade, over 1,000 pallid sturgeon have been collected in the River, and telemetry studies find the species is utilizing numerous habitats along the river, above and below the mouth of the Yazoo. We can provide more information.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-22:

Information has been incorporated into the final documents.

Comment 11-23:

17. p. 233, under "Threatened and Endangered Species:" The gopher tortoise is not listed as being associated with the species group "species dependent on fire to maintain habitat."[...] A primary threat to the tortoise is habitat fragmentation/habitat modification, which often is the result of fire suppression. Fire is probably the most crucial element of maintaining quality tortoise habitat.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-23:

Although not shown in the draft document, the gopher tortoise was included in this species group in the Ecological Sustainability Evaluation (ESE) tool (database). Thank you for alerting us of this oversight. Editorial corrections have been made in the final documents.

Comment 11-24:

18. p. 234, Figure 77: Move this figure down the page so that it falls within the dusky gopher frog discussion.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-24:

Thank you for your comment. Edit has been made in final document.

Comment 11-25:

19. p. 234, Section 4.5.1 Mississippi gopher frog effect and alternatives: The dusky gopher frog should be part of the "species dependent on fire to maintain habitat" group. Add group here, and add dusky gopher frog to appropriate table in Appendix G.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-25:

Although not shown in the draft document, the gopher tortoise was included in this species group in the Ecological Sustainability Evaluation (ESE) tool (database). Thank you for alerting us of this oversight.

Comment 11-26:

20. p. 235, Table 61: Update burn matrix to 2009 version, attached.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-26:

Burn matrix has been updated. See also response to comment 11-15.

Comment 11-27:

21. p. 235, second paragraph under this section, Last sentence, second word: Replace "banding" with "tagging."

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-27:

Suggested edit has been incorporated into final document.

Comment 11-28:

22. p. 235, third paragraph under this section, second sentence: Replace "Mississippi Gopher Frog Group" with "Dusky Gopher Frog Recovery Team."

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-28:

Suggested edit has been incorporated into final document.

Comment 11-29:

23. p. 236, Figure 78: Move figure down under discussion of Mississippi sandhill crane.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-29:

Suggested edit has been incorporated into the final document.

Comment 11-30:

24. p. 236, section Mississippi gopher frog CMU alternatives and effects: This section is correct as Plan is currently written. However, if CMUs are added or modified, this paragraph will need to be amended.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-30:

Thank you for your comment.

Comment 11-31:

25. p. 247, Section 4.5.9: Per Appendix G (Ecosystems and Species Diversity Report), Table G 71, (p. G-88), include 'Species sensitive to hydrologic modification of wetlands' in the list of species group associations.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-31:

Suggested edit was incorporated into final document.

Comment 11-32:

26. p. 276, Section Downed wood associates. first paragraph, last sentence: Last sentence seems incomplete. Stumps were removed in past, but need to present the current management practices.

Letter Number 11

Technical, Editorial (123)

Response 11-32:

Suggested edit has been incorporated into the final document.

Comment 11-33:

27. pp. 276 and 277, Section Downed wood associates environmental effects: This section is duplicative of what appears under 'Fire injury environmental effects.' Also need to discuss downed wood effects.

Letter Number 11

Technical, Editorial (123)

Response 11-33:

Effects discussion was intended to reflect how National Forests in Mississippi management actions would affect species in this group and not effects of downed wood on species group.

Comment 11-34:

28. p. 279, Section Species sensitive to fire injury environmental effects: This section is duplicative of that under downed wood discussion and appears to be a general discussion of forestry management. Suggest more focus on fire environmental effects.

Letter Number 11

Technical, Editorial (123)

Response 11-34:

Effects discussion focuses on how National Forests in Mississippi management actions would affect species in this group not just the effects of fire on species in the group. As a result since management actions are generally similar the language was repeated where appropriate.

Comment 11-35:

29. p. G-9, Section Upland longleaf pine forest and woodland management strategy: It would be appropriate to discuss the specifics of what is meant by 'growing season'burning in this section.

Letter Number 11

Technical, Editorial (123)	Disturbance Regimes (240.0101)

Response 11-35:

See response to previous comment Response: 11-8

Comment 11-36:

30. p. G-61, Table G 42: Louisiana quillwort should not be listed as a pine flatwoods associate. The species occurs along low-order intermittent and perennial streams and their associated floodplain forests within Mississippi.[...]31 . p. G-68, Table G 50: Louisiana quillwort should not be listed as a seeps, springs, and seepage swamps associate. The species occurs along low- order intermittent and perennial streams and their associated floodplain forests within Mississippi.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-36:

Although Louisiana quillwort occurs within low-order intermittent and perennial streams and floodplain forests, many experts felt that this species was also associated with seeps, springs and seepage swamps (or

the affiliated streams) and management included in this ecosystem could affect the species so it was included as an associate.

Comment 11-37:

32. pp. G-84-85, Table G69, Species dependent on fire to maintain habitat: Both the gopher tortoise and the dusky gopher frog are missing from this table and should be included.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-37:

Thank you for noting over-sight in draft table. Species have been included in table of final documents.

Comment 11-38:

33. p. G-84, Table G 69: Louisiana quillwort should not be listed as a species dependent on fire to maintain habitat. The species is dependent on periodic scouring floods to maintain its habitat. The species should be removed from this group.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-38:

While the streams mentioned are not directly affected by fire, the associated habitat is, which is why it was incorporated into this group.

Comment 11-39:

34. pp. G102-103: The federally endangered Isoetes louisianensis (Louisiana quillwort) and Lindera melissifolia (pondberry) are species sensitive to canopy cover modifications and should be included here. Canopy modifications were cited as threats to these species in their listing documents and recovery plans.

Letter Number 11

Technical, Editorial (123)	Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-39:

Though not reflected in the draft, these species were included in the Ecological Sustainability Evaluation (ESE) tool (database). The final document reflects that these species are sensitive to canopy cover modifications.

Comment 11-40:

35. p. G-151: Appendix G's Table G.7, Threatened and endangered species removed from the National Forests in Mississippi list due to no known occurrence."Include an explanation why the species were removed from the list. For example, was the original locality information in error or was the species extirpated from the areas?

Letter Number 11

Endangered Species Act (220.0303)	Species: TES, etc. (240.03)

Response 11-40:

Species on this list do not occur nor have they been found within National Forests in Mississippi boundaries. This is based on many variables such as expert group meetings during the planning process, surveys done on the Forest, species ranges, etc.

Comment 12-1:

There is no mention of groundcover restoration/monitoring. Groundcover indicators provide a wealth of information regarding the measurement of conservation goals as they reveal management history and can be used at multiple scales. There are a suite of plant species that are less responsive to disturbance and a number of publications out there addressing this. We do understand these indicator species can vary between districts and even within districts.

Letter Number 12

Plant Species: TES, etc. (241.01)

Response 12-1:

Ground-cover restoration is included within ecosystem restoration as a whole. Ground-cover restoration is a result of managing ecosystem characteristics such as fire regimes, basal area, and invasive species management. The National Forests in Mississippi has invested in an intensified Forest Inventory and Analysis protocol designed to provide landscape level inventory plot data (including ground-cover classification) as a component of our long-term monitoring strategy.

Comment 12-2:

Removing the gopher tortoise as a management indicator species: In Appendix F (Management Indicator Species), the justification for the removal of gopher tortoises as a management indicator species is that response to management takes a long time because they are a K- species. That is not necessarily true as gopher tortoises will start occupying younger stands of Longleaf pine forests as the ground cover conditions become favorable. Red cockaded woodpeckers require old growth longleaf pine stands and are not directly tied to groundcover as they rely on the insect species attracted to groundcover. Gopher tortoises feed directly on the groundcover and, in our opinion, are indeed indicators of management in terms of groundcover restoration goals at various restoration phases of Longleaf pine.

Letter Number 12

Indicator Species (243.02)

Response 12-2:

Gopher tortoise was removed as a management indicator species because of the amount of time it takes to show population responses to management. Although gopher tortoises will move from less favorable areas to better suited areas, true population growth via natality, which is what is measured in population surveys, remains to be slow with K-species making them a poor management indicator species. Although this species is no longer a management indicator species, management and monitoring for this species is still a high priority for the National Forests in Mississippi and will continue.

Comment 13-1:

I support the Desired Alternative ("C") outlined in the DEIS. This seeks to restore natural forest ecosystems while increasing management above current levels.[...]At the same time, I question whether significantly increased management can be accomplished in the face of budget and personnel restrictions alluded to in the Plan.

Letter Number 13

Proposed Action, Decision (120)

Response 13-1:

Thank you for your comment. The range of alternatives evaluated in the environmental impact statement addresses a shift in management priorities if funding and staffing levels were to decline.

Comment 13-2:

I note that "81% of NF System in Mississippi is suitable for timber production." This is a reasonable balance that protects the many resources of our National Forests while allowing for a timber program that maintains forest health, aids local rural communities, and generates needed revenue for the US.[...]Though beyond the scope of your request, and requiring Congressional changes, I would support a policy where a portion of the revenue generated from a District is returned to the District to support the many management activities required.

Letter Number 13

Economic and Social Conditions (280)

Response 13-2:

Thank you for your comment and support for National Forest management.

Comment 13-3:

The product mix mentioned on page 140 of the Plan does not include pine poles. The DeSoto and Chickasawhay Districts in particular produce significant numbers of poles due to the large percentage of longleaf pine on these districts and access to pole markets. Pine poles have historically commanded a much better price than pine sawtimber, and this should be reflected in the analysis.

Letter Number 13

Timber Management (142)	Resource Value (281.01)

Response 13-3:

Table 17 of the revised plan displays the estimated product mix for the Timber Sale Program Quantity in four broad categories. The values from the pole timber product class, while not displayed separately in the table, were included in the pine sawtimber product estimate for modeling purposes only. Historical sale volumes and values were included in the analysis which captured the higher value for pole timber product class in our analysis.

Comment 13-4:

Table 40 of the Plan (p. 162) presents an inventory of possible old-growth acreage, by district and community type, dated July 8, 2005. Less than 2 months later, Hurricane Katrina devastated forests in Mississippi, and the Plan acknowledged that the "DeSoto and Chickasawhay Ranger Districts took the brunt of Hurricane Katrina" (p. 170). As such, the acres presented for these Districts are suspect, particularly for the "River Floodplain Hardwood" type, as this type sustained greater damage than other forest types. I suggest a revision of the acres in the above 2 districts, as these numbers do not currently reflect the reality post-Katrina.

Letter Number 13

Effects Analysis (122)	Ecosystem, Habitat Health (240.01)

Response 13-4:

We recognize that impacts from Hurricane Katrina changed the pre-Katrina preliminary old- growth inventory stand conditions, however the preliminary inventory of old-growth still the best location information available for potential old-growth conditions for those units. While the existing conditions of the potential old-growth stands were affected by Hurricane Katrina the revised plan desired conditions and objectives remain unchanged. The primary objective for old- growth is that approximately 10 percent of all forested lands across all districts and across all ecological community types are identified for old growth or future old growth. Stand condition information will be updated during identification and establishment of the 10 percent old-growth objective.

Comment 13-5:

According to the DEIS, the proposed alternative ("C") calls for harvesting 16% of net forest growth (or 25% based on the Oswalt et al., 1997 data). By the end of the 5th decade, according to the DEIS (p. 315), 82% of the forests will be in the 60+ age category. Such a high percentage in older age categories predisposes the trees to damage from a variety of factors including windstorms, ice storms, insects, diseases, and other mortality factors. A more balanced age class distribution would result in better forest health, without compromising amenity values we obtain from the forest.

Letter Number 13

Effects Analysis (122)	Forest Health (230.03)

Response 13-5:

The revised plan modeled outcomes for 5 decades. It was apparent from this modeling that attaining the desired conditions for the major systems was likely to take over a century, even for the proposed action alternative. We concur with your observation, however the revised plan objectives reflect an assumption that federal budgets and staffing levels will either remain flat or decline during the first plan period. Alternatives D and E would result in a more balanced age class distribution providing improved forest health conditions. Those alternatives were developed and evaluated to demonstrate that with additional funding the Forest could accomplish restoration objectives and enhance forest health conditions in an ecologically and environmentally sustainable manner.

Comment 13-6:

The cost/benefit analysis contained in the DEIS is suspect. Some data are "direct" impacts, and others likely contain "direct and indirect" impacts. Mixing these two data sources results in an incomplete and

incomprehensible analysis. Further, no Discount Rate is given, and this is used in Net Present Value (NPV) calculations. Though I am not a forest economist, an independent review would help this section.

Letter Number 13

Cost/Benefit Outcome (281.02)

Response 13-6:

Table 78 in Chapter 4 of the environmental impact statement displays the present values of costs and benefits for the five alternatives evaluated. The revenues were derived from various Forest Service data sources. Mineral program revenues from USDI Minerals Management Agency receipt reports. Revenue values derived from vegetation management, minerals and recreation fee collection represent actual real dollar collections that were used in the present net value calculation. The dispersed recreation and wildlife values were derived from Forest Service National Visitor Use Monitoring estimates for the National Forests in Mississippi recreation uses and regionally derived values for recreation activities occurring on the National Forests in Mississippi. The calculation of cumulative present values of cost and benefits utilized a 4% discount rate.

The entire economic section in the final environmental impact statement was reviewed and updated to incorporate 2010 economic and census data that became available between of the draft and final versions.

Comment 13-7:

Necessary activities such as invasive species control and prescribed fire are crucial to maintaining ecosystem health. In the future we will see greater challenges with invasive species, as well as challenges to our ability to use prescribed burning.

Letter Number 13

Forest Health (230.03)	Fire, Fire Risk (236)

Response 13-7:

We concur that invasive species control and prescribed fire are critical to maintaining ecosystem health.

Comment 13-8:

The DEIS (p. 117) documents what can only be considered as wild fluctuations in the amount of timber harvested in Mississippi's National Forests over the past 20 years. This is not good for forest health or local communities. The Forest Service must have the ability to plan and conduct a timber harvest program that benefits forest health without compromising other important benefits from the forest. A stable program also benefits rural communities by providing jobs and income through forest health and restoration activities.

Letter Number 13

Timber Management (142)	Timber Resource (242)	Community Economic Effects (281.03)

Response: 13-8

We concur, attainment of ecosystem desired conditions are dependent upon implementation of a stable, consistent, integrated vegetation management and prescribed fire program that promotes enhanced forest health and provides a steady flow of economic benefits to our local communities.

Comment 13-9:

I encourage the National Forests to identify specific opportunities where they can showcase forest management practices to both landowners and the interested public. Some of this already occurs, as the Chickasawhay Ranger District has the "Gavin Auto Tour" and "Managed and Unmanaged 40" demonstration areas. A specific recommendation is to implement demonstrations on how to convert from even-age to uneven-age management over time. I note on Table 14 of the Plan that there are no appreciable acres of uneven-age management proposed, and feel this is an opportunity to test such a system across Mississippi's National Forests.

Letter Number 13

Timber Management (142)

Response 13-9:

Uneven aged management utilizing group selection method is permitted but not emphasized or mandated by the revised plan. Use of group selection is envisioned to be desirable primarily in areas with high visual quality expectations where maintaining over story is important. Uneven aged harvest methods were not expected to provide ecological conditions that could not be achieved using even aged thinning and regeneration harvest methods.

Comment 14-1:

Need to consider adding Whiskey Creek Hills and Steve Hills as special areas. Whiskey Creek Hills was originally considered for Wilderness Designation during RARE 1 Study. Need to reexamine Milky Creek area for special area designation also. Need to accelerate designations of existing proposed RNA's to designate through NEPA process.

Letter Number 14

Potential for Special Designation (270.01)

Response 14-1:

Twenty proposed new special areas were evaluated during the plan revision process. Table 17 in Chapter 3 of the Final Environmental Impact Statement lists the areas evaluated. Eighteen of the twenty areas evaluated are being designated as special management areas in the revised plan. See section 3.5.5 of the Final Environmental Impact Statement for additional information.

Appendix C of the Final Environmental Impact Statement documents our review of potential wilderness areas that may be suitable for recommendation for congressional designation as wilderness study areas. For additional information, see Appendix D of the Final Environmental Impact Statement which addresses Special Areas: Status, Trends and Strategies.

You specifically name three areas for consideration. However, there was not enough site specific information provided on their location and special or unique characteristics for detailed consideration at this late stage in the plan revision process. Since plan implementation allows for consideration of special

area designations between plan revision cycles the National Forests in Mississippi has elected to move forward with completion of the plan revision process.

Comment: 14-2

Are heritage resources now being called cultural resources?

Letter Number 14

Technical, Editorial (123)

Response 14-2:

Cultural resources fall under the umbrella of heritage resource management.

Comment 14-3:

Revisit use of hydraulic fracturing for natural gas development in view of current controversy and new information regarding potential adverse effects on ground water.

Letter Number 14

Oil & Gas (135.02)

Response 14-3:

In August 2010, the National Forests in Mississippi renewed its decision for Lands Available for Oil and Gas Leasing. All plan revision alternatives incorporate the 2010 oil and gas leasing decision as continuation of management direction.

The USDA Forest Service and USDI Bureau of Land Management share responsibility for implementation of the federal minerals program on National Forest System administered lands. Both agencies follow a Memorandum of Understanding which defines each Agency's roles and responsibilities regarding minerals program management on federal lands. The Bureau of Land Management was a cooperating agency in the development of the National Environmental Policy Act disclosure documents for the 2010 Lands Available for Oil and Gas Leasing decision and the Forest Plan revision decisions as they relate to federal minerals management on the National Forests in Mississippi.

A two-staged decision process is followed regarding minerals management on the National Forests in Mississippi. The first stage is the identification of lands available for leasing which was addressed in the 2010 leasing decision and subsequently incorporated as management direction in the revised plan. The second-stage decision occurs when a federal lease holder proposes to exercise their rights to extract minerals under the lease. At such time, the lease holder submits an Application for Proposal to Drill (APD). The Forest Service and Bureau of Land Management then conduct a site specific (National Environmental Policy Act compliant) analysis addressing potential surface and sub-surface impacts. This analysis provides the basis to support agency decisions regarding final site location and the lease holder's operation plan terms and conditions.

Hydraulic fracturing for natural gas development is currently not an extraction technique employed on production well sites on the National Forests in Mississippi. If an application for proposal to drill were to include hydraulic fracturing extraction techniques, then a determination as to whether or not to permit such activities would be addressed in the site-specific analysis for the application to drill.

Comment 14-4:

Address silvicultural and economic soundness of restoring longleaf pine on Homochitto National Forest. Highly productive loblolly sites produce prolific natural seeding of loblolly defeating any attempts to restore longleaf regardless of herbicide use and prescribe burring. Focus on intensive thinning regimes to promote forest health here.

Letter Number 14

Forest Health (230.03)	Cost/Benefit Outcome (281.02)

Response 14-4:

Appendix C of the final plan provides a listing of possible actions by administrative unit. Table 35 displays the expected outcomes on the Homochitto National Forest during the first decade of forest plan implementation. Treatments on the upland loblolly pine forest ecological system include 36,000 acres of species composition and structural improvements (thinning) which promote forest health. The first decade projection is 5,000 acres converted to appropriate ecological systems.

Comment 14-5:

5. What happened to the featured species concept that was in the 1985 Plan? Typo in Table 63 (Southern).

Letter Number 14

Technical, Editorial (123)

Response 14-5:

The featured species concept was replaced by the ecological sustainability framework described in detail in Appendix G of the Final Environmental Impact Statement. See also Section 2.4 Species Diversity in the final revised plan.

Comment: 14-6

Need to add Canadian thistle to list of non-native invasive/noxious plants.

Letter Number 14

Invasive, Noxious Plant Species (241.02)

Response: 14-6

Table 64 in Section 4.10.1 of the Final Environmental Impact Statement lists the high priority invasive plant species across the Forest. Canadian thistle did not make the high priority list because no samples have been collected in the State of Mississippi.

Comment 14-7:

Are the standards and guides from 1985 Plan rolled over into this Plan? Are all 18 amendments to current planned rolled over into this proposed plan?

Letter Number 14

Technical, Editorial (123)

Response 14-7:

The 1985 Forest Plan including all its amendments was the starting point for development of the revised plan. The management guidelines and standards found in Chapter 4 of the revised plan originate from the standards and guidelines in the 1985 plan. The majority of the original plan direction is reflected in the revised plan management direction. The revision of the forest plan incorporates new information, addresses evolving issues and trends, accounts for changes in national policies and direction, and includes updated views from public users and stakeholders. The revised plan differs from the previous plan in focusing more on an integrated vision of how we want the national forests to look and function in the future rather than how individual projects would be implemented. The revised plan uses a new format and emphasis an adaptive management approach that will continue to include public and technical adjustments as changes are needed.

Comment 14-8:

Since adequate funding and manpower is not available to do the necessary improvements for forest health, what direction will be given to the Districts to prioritize where and when compartments would be entered? I would like to see how the order of entry has changed from every compartment being entered every 10 years to what it will be in this proposed plan?

Letter Number 14

Technical, Editorial (123)

Response 14-8:

Appendix C of the revised plan describes possible actions that may subsequently take place on the districts at the project or activity level to help maintain existing conditions or move toward desired conditions.

Comment 14-9:

Need to accelerate resolution of claims and encroachments. Need to ensure all property lines are refurbished on regular maintenance schedule, including RNA and Wilderness boundaries.

Letter Number 14

Land Ownership Uses (170)

Response 14-9:

Sections 2.6.4 and 3.5.4 of the revised plan describe lands and special uses desired conditions and management strategies. Program implementation is dependent upon staffing and funding levels being allocated to the forest for these activities.

Comment 14-10:

Are all shortleaf stands to be regenerated to shortleaf on the DeSoto NF? Does longleaf restoration on these sites take priority?

Letter Number 14

Vegetation Management (141)	Ecosystem, Habitat Health (240.01)

Response 14-10:

Table 31 in the revised plan displays proposed outcomes for ecological systems on the De Soto District. A review of the table indicates no planned conversions of shortleaf pine to longleaf. Loblolly pine and slash pine stands located on sites deemed more appropriate for longleaf would be the target areas of conversion in the first decade of plan implementation.

Comment 14-11:

Seems like the Forest Service could make an attempt to buy those mineral rights from the third party so those proposed wilderness areas inclusions can be designated wilderness on the Black Creek Wilderness.

Letter Number 14

Wilderness, Roadless Character (270.02)

Response 14-11:

Purchase of mineral rights from private land holders would require special congressional authorization.

Comment: 14-12:

Are there approved habitat management plans yet for gopher tortoise, gopher frog, rcw, and sandhill crane by the USFWS?

Letter Number 14

Animal Species: TES, etc. (243.01)

Response 14-12:

The United States Fish and Wildlife Service is currently developing a recovery plan for the gopher frog and we are a partner in its development. The other species you listed currently have approved recovery plans.

Comment 15-1:

I have had the opportunity to review the LRMP for the National Forests in Mississippi as outlined in your draft. After reviewing the draft and data, my choice for the proposed plan would be Alternative D, "an increased emphasis on restoration of historical forests." Regardless of the final plan, below listed are my major concerns: Old Growth strategy, Species Viability [help enhance red cockaded and Louisiana black bear habitats], Recreational Management, Material Management [authorizes oil and gas leasing]. As I am a primary user of the Homochitto and De Soto National Forests, I would agree that Alternative D is best for all Mississippi National Forests.

Letter Number 15

Alternatives (comparing, range) (121.02)	Minerals & Geol. Resources (235)	Species: TES, etc. (240.03)
Recreation (260)		

Response 15-1:

Thank you for your interest in National Forest in Mississippi resource management.

Comment: 16-1

By this letter, we are our voicing existing and ongoing comments and concerns related to the damages to county public roadways and infrastructure due to logging practices within the Homochitto National Forest.

Letter Number 16

Harvest Levels (Actual) (142.03)	Transportation System Management (150)

Response 16-1:

Please see response to comments 16-3 and 16-4.

Comment 16-2:

The draft EIS states that the USFS will be cutting 30% of the target in the Homochitto Forest when it only encompasses 19% of the entire National Forest lands in Mississippi. We believe that the largest target area should be in the DeSoto/ Chickasawhay Districts where the Fish and Wildlife Service has declared these two districts as red-cockaded woodpecker recovery sites.

Letter Number 16

Harvest Levels (Actual) (142.03)	Species: TES, etc. (240.03)

Response 16-2:

Appendix C of the revised plan describes possible actions that may subsequently take place on the districts at the project or activity level to help maintain existing conditions or move toward desired conditions. The lists of possible actions are not intended to be all inclusive nor are they decisions.

It appears you may be comparing the Timber Sale Program Quantity (TSPQ) by district displayed in Table B-22 of the environmental impact statement for likely volume outputs for the first decade. The values in Table B-22 are not "cutting" targets. The 60 MMCF timber sale program quantity for the Homochitto National Forests for the first decade was derived from vegetation management model results for treatment of 6,898 acres of regeneration cutting and 36,284 acres of commercial thinning on the Homochitto National Forest in the first decade (see Table 17 in the revised plan or Table B-12 in the final environmental impact statement).

These anticipated treatments would help maintain existing desired conditions and/or more toward desired conditions consistent with ecosystem management priorities reflected in the plan. These estimates are model estimates based on current resource capability and biological potential. For the selected alternative, the estimate in the Timber Resource Program Suitability and Sustainability Analysis for the Homochitto District is 33% of that alternative's outcome in terms of volume. For acres of harvest, the Homochitto District's share is 26%. The estimates were based on current resource capability which includes budget and staffing.

The analysis did not look at changes based on staffing decisions; rather alternatives considered overall program level changes with a district's share remaining proportionally the same. These proportions were based on traditional target accomplishment capability of each district unit. The allocation of targets to districts may change over time but these allocations are administrative in nature and are not made by the Land and Resource Management Plan for the National Forests in Mississippi.

Appendix C of the revised plan also includes a description of ecosystem vegetation management priorities by district. The priorities for the Homochitto are (first) threatened and endangered species habitat improvement, (second) restoration of vegetation communities outside red-cockaded woodpecker habitat management, then followed by management practices that promote forest health. Table 36 in the revised plan displays the expected outcomes for ecological systems on the Homochitto Ranger District during the first decade of plan implementation. One result of these treatments would be the removal of approximately 60 MMCF for timber in the first decade of plan implementation to achieve desired habitat conditions.

The red-cockaded woodpecker occurs on the Bienville, Chickasawhay, De Soto and Homochitto Ranger Districts. Throughout the revised plan, threatened and endangered species protection and habitat enhancement are a priority. Red- cockaded woodpecker populations are generally increasing as habitat is being maintained, enhanced, or restored and nesting and foraging conditions are being improved (see Table 17, in Section 3.5.4 of the final environmental impact statement). The program levels in the revised plan, for all districts with red-cockaded woodpecker populations, are intended to maintain and improve habitat conditions such that population growth at rates prescribed in the recovery plan are achieved forest-wide.

Comment 16-3:

The EIS has failed to identify the effects of the 30% target within the Homochitto National Forest.[...] With the target area being approximately 39,000 acres, we do not need the aggressive timber cutting scheme that is planned for this area.

Letter Number 16

Cumulative Effects Analysis (122.01)	Harvest Levels (Actual) (142.03)

Response 16-3:

The revised plan proposed management activities on the Homochitto Ranger District are displayed in Table 17 in Appendix B of the final revised plan. The estimated total vegetation management practices on the Homochitto Ranger District are 43,182 acres (6,898 acres regeneration cutting and 36,284 acres from thinning) resulting in an estimated 60 MMCF of timber volume removal in the first decade of plan implementation. The impacts from all activities were evaluated in the final environmental impact statement.

Regarding concern for concentrating impacts in Franklin County please note that during the analysis for the development of the Land and Resource Management Plan for the National Forests in Mississippi, it was determined that the Homochitto District could better meet the USDI Fish and Wildlife Services recovery standards for the red-cockaded woodpecker by expanding the boundaries of the tentative habitat management area. So, all alternatives analyzed except Alternative B (No Action Alternative) increases the red-cockaded woodpecker habitat management area from 76,755 acres to 93,502 acres. This expands the red-cockaded woodpecker habitat management area into Amite and Wilkinson Counties instead of the original designation that was predominantly in Franklin County. The selected alternative for the revised plan includes expansion of the red- cockaded woodpecker habitat management area to approximately 93,502 acres. This should allow some of the priority red-cockaded woodpecker habitat improvement harvests to be in Amite and Wilkinson Counties.

Comment 16-4:

The former plan shows the cutting in compartmental areas of approximately 1000 acres each which was to vary throughout the forest each year. The new directive has the units in 8,000 to10,000 acre areas which puts undue stress on our county's infrastructure including bridges, culverts, drainage areas and especially our roads since the cutting is in such consolidated areas. This, in turn, leads to burdens on the local taxpayers in our small, rural county. We feel that the öld style'of timber management has worked well in the past and we are against the new EIS.

Letter Number 16

Cumulative Effects Analysis (122.01)	Harvest Levels (Actual) (142.03)	Transportation System Management (150)

Response 16-4:

The National Forests in Mississippi develops projects that implement our agency's mission and priorities which results in the selection of areas for the preparation of timber sales to accomplish resource management objectives. The revised Land and Resource Management Plan for the National Forests in Mississippi does not prescribe management activities on a typical 1,000 acre compartment bases the way the original 1985 plan did. The revised plan establishes ecosystem-based prescriptions for management of broad areas of the National Forests in Mississippi resulting in analysis units larger than the typical 1,000 acre compartment size. This allows for more effective and efficient project planning and implementation. However, your concern is understood, and where practical, efforts to distribute impacts can be made.

To put this issue in context, it is worth considering that the total sale volume on the Homochitto National Forest for fiscal year 2012 was 17 % of the harvest level reported by the State of Mississippi to have occurred in Franklin County. Therefore, National Forest harvest is a small portion of the total harvest from Franklin County. The National Forests in Mississippi Federal Payment to the State of Mississippi for Franklin County in 2012 was $671,275.88. This is $6.99 per acre. These payments are ultimately controlled by Forest Service revenue generated from resource sales. Increased timber sales would ultimately result in increased funding for schools and roads in the counties in which the National Forests occur, likewise a reduction in receipts would reduce payments.

Your concerns related to damages to county public roadways and infrastructures due to logging activities are noted. A portion of federal receipts from revenues received from harvest activities are returned to the counties for the support of local county roads and schools. Payments are made to the counties comprising the National Forests from which payments were generated in accordance with provisions set forth in 16 U.S.C. Sections 500 and 501. These federal payments to States from National Forests receipts are typically the extent to which reimbursements are authorized under federal law.

Normally the Forest Service may only spend funds on roads under its jurisdiction (23 USC 205 /23 USC 201). The one exception is forest roads identified on Schedule A of a Forest Road Agreement wherein the Forest Service may spend funds on improvements to roads under the cooperator's jurisdiction (FSH 1509.11 Section 31.21). The National Forest Roads and Trails Act of October 13, 1964 (16 USC 532-538, Pub. L. 88-657) authorizes Forest Service financing and/or cooperation with other public agencies, private agencies, or individuals for acquisition, construction, and maintenance of forest development roads within or near national forests. A Cooperative Forest Road Agreement administered in accordance with FSH 1509.11 must be established for applicable forest roads. A "forest road" is a road wholly or partly within or adjacent to and serving the National Forests System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

The forest road system for the National Forests in Mississippi is well established. The primary focus of the revised plan for the existing forest road system is on maintenance and rehabilitation; infrastructure additions are anticipated to be limited and dependent on funding availability. Cooperative Forest Road Agreements have been utilized in the past, on a limited basis, and may be appropriate were project specific circumstances warranting consideration is identified.

Comment 17-1:

I am voicing my opinion concerning existing and ongoing comments and concerns related to the damages to county public roadways and infrastructure due to logging practices within the Homochitto National Forest.[...] The draft EIS states that the USFS will be cutting 30% of the target in the Homochitto Forest when it only encompasses 19% of the entire National Forest lands in Mississippi. I believe that the largest target area should be in the DeSoto/Chickasawhay Districts where the Fish and Wildlife Service has declared these two districts as red-cockaded woodpecker recovery sites.[...] With the target area being approximately 39,000 acres, I believe Franklin County does not need the aggressive timber cutting scheme that is planned for this area.

Letter Number 17

Harvest Levels (Actual) (142.03)	Transportation System Management (150)

Response 17-1:

Appendix C of the revised plan describes possible actions that may subsequently take place on the districts at the project or activity level to help maintain existing conditions or move toward desired conditions. The lists of possible actions are not intended to be all inclusive nor are they decisions.

It appears you may be comparing the Timber Sale Program Quantity (TSPQ) by district displayed in Table B-22 of the environmental impact statement for likely volume outputs for the first decade. The values in Table B-22 are not "cutting" targets. The 60 MMCF timber sale program quantity for the Homochitto National Forests for the first decade was derived from vegetation management model results for treatment of 6,898 acres of regeneration cutting and 36,284 acres of commercial thinning on the Homochitto National Forest in the first decade (see Table 17 in the revised plan or Table B-12 in the final environmental impact statement).

These anticipated treatments would help maintain existing desired conditions and/or more toward desired conditions consistent with ecosystem management priorities reflected in the plan. These estimates are model estimates based on current resource capability and biological potential. For the selected alternative, the estimate in the Timber Resource Program Suitability and Sustainability Analysis for the Homochitto District is 33% of that alternative's outcome in terms of volume. For acres of harvest, the Homochitto District's share is 26%. The estimates were based on current resource capability which includes budget and staffing.

The analysis did not look at changes based on staffing decisions; rather alternatives considered overall program level changes with a district's share remaining proportionally the same. These proportions were based on traditional target accomplishment capability of each district unit. The allocation of targets to districts may change over time but these allocations are administrative in nature and are not made by the Land and Resource Management Plan for the National Forests in Mississippi.

Appendix C of the revised plan also includes a description of ecosystem vegetation management priorities by district. The priorities for the Homochitto are (first) threatened and endangered species habitat improvement, (second) restoration of vegetation communities outside red-cockaded woodpecker habitat

management, then followed by management practices that promote forest health. Table 36 in the revised plan displays the expected outcomes for ecological systems on the Homochitto Ranger District during the first decade of plan implementation. One result of these treatments would be the removal of approximately 60 MMCF for timber in the first decade of plan implementation to achieve desired habitat conditions.

The red-cockaded woodpecker occurs on the Bienville, Chickasawhay, De Soto and Homochitto Ranger Districts. Throughout the revised plan, threatened and endangered species protection and habitat enhancement are a priority. Red-cockaded woodpecker populations are generally increasing as habitat is being maintained, enhanced, or restored, and nesting and foraging conditions are being improved (see Table 17, in Section 3.5.4 of the final environmental impact statement). The program levels in the revised plan, for all districts with red-cockaded woodpecker populations, are intended to maintain and improve habitat conditions such that population growth at rates prescribed in the recovery plan are achieved forest-wide.

Regarding concern for concentrating impacts in Franklin County please note that during the analysis for the development of the Land and Resource Management Plan for the National Forests in Mississippi, it was determined that the Homochitto District could better meet the USDI Fish and Wildlife Services recovery standards for the red-cockaded woodpecker by expanding the boundaries of the tentative habitat management area. So, all alternatives analyzed except Alternative B (No Action Alternative) increases the red-cockaded woodpecker habitat management area from 76,755 acres to 93,502 acres. This expansion moves the red-cockaded woodpecker habitat management area into Amite and Wilkinson Counties instead of the original designation that was predominantly in Franklin County. The selected alternative for the revised plan includes expansion of the red- cockaded woodpecker habitat management area to approximately 93,502 acres. This should allow some of the priority red-cockaded woodpecker habitat improvement harvests to be in Amite and Wilkinson Counties.

Comment: 17-2

The EIS has failed to identify the effects of the 30% target within the Homochitto National Forest.

Letter Number 17

Cumulative Effects Analysis (122.01)	Harvest Levels (Actual) (142.03)	Transportation System Management (150)

Response 17-2:

The revised plan proposed management activities on the Homochitto Ranger District are displayed in Table 17 in Appendix B of the final revised plan. The estimated total vegetation management practices on the Homochitto Ranger District are 43,182 acres (6,898 acres regeneration cutting and 36,284 acres from thinning) resulting in an estimated 60 MMCF of timber volume removal in the first decade of plan implementation. The impacts from all activities were evaluated in the final environmental impact statement.

Comment 17-3:

The former plan shows the cutting in compartmental areas of approximately 1000 acres each which was to vary throughout the forest each year. The new directive has the units in 8,000 to 10,000 acre areas which puts undue stress on our county's infrastructure including bridges, culverts, drainage areas and especially our roads since the cutting is in such consolidated areas. This, in turn, leads to burdens on the local taxpayers in our small, rural county. I feel that the öld style'bf timber management has worked well in the past and I am against the new EIS.

Letter Number 17

Transportation System Management (150)

Response 17-3:

The National Forests in Mississippi develops projects that implement our agency's mission and priorities which results in the selection of areas for the preparation of timber sales to accomplish resource management objectives. The revised Land and Resource Management Plan for the National Forests in Mississippi does not prescribe management activities on a typical 1,000 acre compartment bases the way the original 1985 plan did. The revised plan establishes ecosystem-based prescriptions for management of broad areas of the National Forests in Mississippi resulting in analysis units larger than the typical 1,000 acre compartment size. This allows for more effective and efficient project planning and implementation. However, your concern is understood, and where practical, efforts to distribute impacts can be made.

To put this issue in context, it is worth considering that the total sale volume on the Homochitto National Forest for fiscal year 2012 was 17 % of the harvest level reported by the State of Mississippi to have occurred in Franklin County. Therefore, National Forest harvest is a small portion of the total harvest from Franklin County. The National Forests in Mississippi Federal Payment to the State of Mississippi for Franklin County in 2012 was $671,275.88. This is $6.99 per acre. These payments are ultimately controlled by Forest Service revenue generated from resource sales. Increased timber sales would ultimately result in increased funding for schools and roads in the counties in which the National Forests occur, likewise a reduction in receipts would reduce payments.

Your concerns related to damages to county public roadways and infrastructures due to logging activities are noted. A portion of federal receipts from revenues received from harvest activities are returned to the counties for the support of local county roads and schools. Payments are made to the counties comprising the National Forests from which payments were generated in accordance with provisions set forth in 16 U.S.C. Sections 500 and 501. These federal payments to States from National Forests receipts are typically the extent to which reimbursements are authorized under federal law.

Normally the Forest Service may only spend funds on roads under its jurisdiction (23 USC 205 /23 USC 201). The one exception is forest roads identified on Schedule A of a Forest Road Agreement wherein the Forest Service may spend funds on improvements to roads under the cooperator's jurisdiction (FSH 1509.11 Section 31.21). The National Forest Roads and Trails Act of October 13, 1964 (16 USC 532-538, Pub. L. 88-657) authorizes Forest Service financing and/or cooperation with other public agencies, private agencies, or individuals for acquisition, construction, and maintenance of forest development roads within or near national forests. A Cooperative Forest Road Agreement administered in accordance with FSH 1509.11 must be established for applicable forest roads. A "forest road" is a road wholly or partly within or adjacent to and serving the National Forests System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

The forest road system for the National Forests in Mississippi is well established. The primary focus of the revised plan for the existing forest road system is on maintenance and rehabilitation; infrastructure additions are anticipated to be limited and dependent on funding availability. Cooperative Forest Road Agreements have been utilized in the past, on a limited basis, and may be appropriate were project specific circumstances warranting consideration is identified.

[Note: Letter Number 18 resulted in two comments beginning with comment 18-15. The comment letter includes a copy of the e-mail dialogue that was generated while clarifying and resolving the issues raised in the original comment submission.]

Comment: 18-15

Northern Dry Upland Hardwood Forest Desired Ecological Condition Overstories are typically dominated by upland oaks (post, southern red, blackjack, and white) Why not black oak? It was far more common historically in dry uplands than was white oak. Scarlet oak was also common.

Letter Number 18

Technical, Editorial (123)

Response 18-15:

Species listed in Northern Dry Upland Hardwood Forest ecosystem were edited to include suggested species.

Comment 18-16:

Northern Dry Upland Hardwood Forest Management Strategy Forest strategies for restoring, maintaining, and enhancing the northern dry upland hardwood forests should emphasize restoring the appropriate fire regime. In my opinion, priority (or at least consideration) should be given to restoring open oak woodlands in those areas currently designated Northern Dry Upland Forests. The appropriate fire regime in my opinion is the same as for the Shortleaf Pine-Oak Woodlands, not low-intensity fires as mentioned above. Return of relative abundance to approach historical levels is a long-term goal for upland hardwood forests on the National Forests in Mississippi,[…]am asking that the same consideration be given to upland hardwood communities in northern Mississippi. People in the Midwest are ahead of us on this issue because they don't have a lot of upland pine or bottomland hardwoods and therefore are not caught up in this false dichotomy of pines need fire, but hardwoods don't (need much). They speak of their oak woodlands and savannas more or less the same way we talk about longleaf pine. In fact, Nature Serve does have descriptions for oak woodlands and savannas. It's just that it has not recognized them as being appropriate references for northern Mississippi. Nobody does. That is because fire exclusion has been so complete that there are essentially no open oak woodlands left in Mississippi. As far as I know, I am about the only person who has bothered to investigate this. Ultimately, I hope we all can agree that desired conditions should be based at least in part on what will best preserve biodiversity. My experience with the restoration projects at Strawberry Plains Audubon Center and at the Tallahatchie Experimental Forest is that there is a significant net benefit in terms of plant diversity to reducing off-site tree species and implementing fire regimes comparable to those used in longleaf pine ecosystems and oak savannas. Studies in similar habitats in adjoining states have shown similar responses, not just for plants but also for small mammals, birds, most arthropods, and reptiles. I honestly don't care whether this is considered natural or "correct" historically. The results in terms of biodiversity responses speak for themselves. These upland hardwood communities are not filled with trilliums and NEVER will be. Rather, they have a lot of suppressed and non-flowering helianthuses and coreopses and seed banks of lespedezas and other open woodland indicators, presumably waiting for the canopy to be opened up and to be burned. The few shade-tolerant mesophytic herbs that are present (e.g., green dragon, christmas fern, false Solomon's seal) have responded POSITIVELY (or at least not negatively) to opening the canopy and burning. Once the canopy was opened up and we started burning at Tallahatchie Experimental Forest (2010), we started seeing and hearing the calls of bobwhites (for the first time since I'd been working there (1998)). For these reasons, I suggest that open woodlands be ONE of the desired

conditions in areas currently designated as being appropriate for Northern Dry Upland Hardwood Forests.

Letter Number 18

Technical, Editorial (123)

Response 18-16:

The desired condition for dry upland hardwoods was written into the draft plan to reflect what we expected to be able to accomplish with likely resources. Your comment is valid and scientifically based.

The desired condition of dry upland hardwood has been edited in the revised Land and Resource Management Plan to state that it will contain some open canopy conditions. In addition, oak species composition for northern dry upland hardwoods has been edited to substitute black and scarlet oak for white oak. Chapter 3 of the revised Land and Resource Management Plan has a stated objective for the first decade to reduce the density of 1700 acres of dry upland hardwood and restore dry upland hardwood on 1600 acres from the loblolly forest type.

These activities result in a relatively small percentage increase in acreage of dry upland hardwoods and open canopy conditions. The interdisciplinary team developing the plan was concerned that areas opened with overstory reductions to woodland conditions in dry upland hardwoods would be difficult to maintain with fire return intervals likely to be achieved.

The revised Land and Resource Management Plan places a higher priority on threatened and endangered species habitat, and restoration of longleaf which supports many of the threatened and endangered species occurring on the Forest. A section has been added to Appendix C of the revised Plan to provide details on the vegetation management priorities for each district.

[Note: During review and response to comments the first four comments originally identified were eliminated resulting in the comments for letter number 19 beginning at 19-5.]

Comment 19-5:

EPA recommended that future forest land and resource management plan DEIS include more quantitative evaluation. One method for quantitative evaluating ecosystem restoration includes that of environmental accounting (see Odum, H.T. (1996) Environmental Accounting: Emergy and Environmental Decision Making, Wiley, U.S.A). Environmental accounting utilizes emergy principles to evaluate all of the processes in an ecological system by back calculating the solar energy that it took to get to an equilibrium state for the processes. The value is in solar emjoules and because all of the processes are calculated using the same metric, it is feasible to value all of the processes and relationships. We have attached and/or referenced three other documents for your future consideration, Assessing environmental costs and impacts forestry activities: A multi-method approach to environmental accounting by Elvira Buonocorea, Tiina Hayhaa, Alessandro Palettob, Pier Paolo Franzesea, Valuing Forest Ecosystem Services In Maryland And Suggesting Fair Payment Using The Principles OJ Systems Ecology and Environmental Accounting OJ Natural Capital and Environmental Services of the US National Forest System by Elliott Campbell, 2008. For more information on energy analysis contact Dan Campbell at campbell.dan@epa.gov.

Letter Number 19

Effects Analysis (122)	Ecosystem, Habitat Health (240.01)

Response 19-5:

Thank you for your comment. Our agency is currently evaluating environmental accounting and assessment tools, your reference citations are appreciated.

Comment 19-6:

EPA notes that alternatives C-E, with implementation of best management practices, would appear to be the best approach for ecosystem restoration

Letter Number 19

Preferred Alternative (121.0201)	Ecosystem, Habitat Health (240.01)

Response 19-6:

We concur that alternatives C-E appear to be best approach for ecosystem restoration.

Comment 19-7:

Recommendation: EPA recommends that the Forest Service continue to comply with the federal and state guidelines associated with prescribed burns. EPA notes that Alternatives A and B will result in the less air quality impacts in the short-term. While Alternatives C, D, and E will result in the greatest hazardous fuels reduction and ecological restoration and maintenance, they will also contribute to the greater air quality impact. Increased prescribed burning during the growing season will result in more particulate matter and ozone formation. However, according to the DEIS the increase is not expected to affect the attainment of federal and state air quality standards.

Letter Number 19

Laws, Policies (110.04)	Air Quality Management (133.01)	Fire, Fire Risk (236)

Response 19-7:

We concur with your findings and recommendations.

Comment 19-8:

Recommendations: EPA supports the effective use of BMPs and adherence to forest standards and guideline for water quality. We recommend reducing the nonpoint source pollution of surface and ground waters that can result from forestry activities. These activities include but are not limited to: Tracking the implementation of best management practices (BMPs) used to control nonpoint source pollution generated by forestry practices. Developing water-quality monitoring plans to evaluate the effectiveness of forestry BMPs in meeting water-quality goals or standards. Design of monitoring projects and the selection of variables and methods to correlate BMP implementation with changes in stream water quality. Providing information on methods for sample site selection, sample size estimation, sampling, and result evaluation and presentation. The focus is to develop statistical approaches needed to collect and analyze data that are accurate and defensible. EPA supports efforts to implement the nonpoint source (NPS) total maximum daily load (TMDL) program. Nonpoint source TMDLs and watershed-based plans designed to implement the NPS TMDLs, provide the necessary link between actions on the ground and the water quality results to be achieved. EPA continues to support planning at the landscape level to address broader ecological concerns such as biodiversity, watershed maintenance and restoration, and forest fragmentation. DEPA recommends that ecological and other environmental values should be the primary,

driving factors in the identification, protection, and management of roadless areas in the National Forests.

Letter Number 19

Water Quantity (232.04)

Response 19-8:

The Forest Service is committed to implementation of best management practices to ensure water quality goals and standards are maintained.

Comment 19-9:

EPA recommends commitments to best management plan, mitigation and monitoring should be documented in a summary tracking form of project commitments.

Letter Number 19

Soils (234)

Response 19-9:

The agency has a Planning, Appeals and Litigation System (PALS) national database that documents and tracks agency project-level decisions from proposed action to project level decision and implementation. Our monitoring and evaluation procedures support an adaptive management approach that fosters a continuous improvement in management philosophy.

Comment: 19-10

The DEIS indicates that the Forest Service's research activities are expected to help both public and private land managers better understand changing conditions and determine appropriate management approaches for both adaptation and mitigation. EPA notes that by restoring native longleaf pine where loblolly and shortleaf pine currently exist, Alternatives C, D and E would result in a national forest less vulnerable to the effects of climate change than Alternative A.

Letter Number 19

Climate Change (233.02)

Response 19-10:

We concur with your findings.

Comment 19-11:

EPA supports restrictions on new roadway construction in the Sandy Creek RARE II study area and protecting sensitive natural resources.

Letter Number 19

Oil & Gas (235.02)

Response 19-11:

Thank you for your comment. The final plan direction for the Sandy Creek RARE II further study area prohibits new road construction to ensure compliance with Federal Court rulings on the 2001 National Roadless Rule.

Comment 19-12:

Road maintenance and reconstruction would vary by alternative with greater need for these activities as vegetation management activities increase from alternative A through E.

Letter Number 19

Transportation System (250)

Response 19-12:

We concur with your findings.

Comment 19-13:

The EJ analysis should indicate the efforts made to identify subsistence consumption within the planning area that targeted low-income and minority populations and summarize any EJ concerns raised during the public engagement process, particularly in those areas that experience higher minority and low-income populations.

Letter Number 19

Environmental Justice (282.05)

Response 19-13:

Dependence on subsistence consumption of fish or wildlife is not recognized by the regulations of the Mississippi Department of Wildlife Fisheries and Parks for any segment of the State of Mississippi population. Wild game and fish harvested provides supplemental nutrition for all segments of the population who harvest game and fish regardless of their income status.

However, the statement in the Environmental Justice analysis was based more on the fact that it is not recognized by the State agency which regulates harvests of game and fish. There were no concerns raised during the public engagement process related to dependent consumption of game, fish, berry or other vegetative food gathering. The effects of the alternatives are based on differences in habitat quality and growing conditions. There would be no disproportionate negative impacts to minority or low-income populations on the availability of the supplemental nutrition obtained from these natural resources.

Comment 19-14:

EPA recommends forest managers examine the effects of fragmentation on a species-by species basis with emphasis placed on threatened and endangered species and also 'keystones' species that play an important role in an ecosystem relative to their abundance and whose removal has large ripple effects on other plants and animals as well as on ecological processes. To reduce the impact of timber harvesting on biodiversity, EPA recommends forest management consider the mosaic of forest patches on the landscape and the connectedness of habitat for forest species in planning future cuts.

Letter Number 19

Fragmentation, Connectivity (240.0102)

Response 19-14:

The final environmental impact statement considered the effects of fragmentation on individual species and species groups as part of our ecosystems and species diversity report and viability evaluation process. Final plan direction and management guidelines promote a strategy for reducing fragmentation with priority given to maximizing the amount of contiguous forest area when planning stand regeneration. Priority is to be placed on locating new stands adjacent to existing young or regenerating stands to maximize the amount of contiguous mature forest.

Comment 19-15:

EPA recommends management of National Forests place emphasis on sustaining the ecological values of healthy forests. This should include: Protection of water quality and yield, sensitive groundwater recharge areas, and undisturbed headwaters of streams and public drinking water supplies. Greater attention to the adverse impacts of logging roads and the value of undisturbed buffer zones along streams and rivers and the designation of wild and scenic rivers. Soil quality maintenance and nutrient stocks that hold the key to current and future forest productivity should also remain a priority. Conservation of forest biodiversity by reducing forest fragmentation (as a result of clearcuts and roads), avoiding harvest in vulnerable areas such as hardwood or old growth stands and riparian zones, and restoring natural structural complexity to cutover sites.

Letter Number 19

Environmental Quality and Ecosystem Integrity (230.01)	Forest Health (230.03)	Water Resources (232)
Soils (234)		

Response 19-15:

The ecological values expressed in these concerns were the drivers for development of the revised plan desired conditions, and objectives. Where there was the potential for undesirable impacts, standards and guides were developed to prevent or reduce impacts. The revised plan protective guidelines and standards for these concerns are located in the following sections: Soil and water quality, stream sedimentation and vulnerable area protection - sections 4.2.2, 4.2.3, 4.2.4, 4.2.6, and 4.2.8; Forest fragmentation, loss of habitat, species impacts and structural complexity section 4.2.1.

Comment 20-1:

The revised plan calls for 4 bird species to be used as Management Indicator Species. Those species will be monitored to assess the effectiveness of management plans for different habitat types: Red-cockaded Woodpecker: Mature pine forest. Actively manage for this endangered species. Pileated Woodpecker: Mature forests with snags/cavities Wood Thrush: Tracts of unbroken forest Hooded Warbler: Mature forest we feel that Hooded Warbler should be removed from the list, as we found them in pretty much every type of habitat (from mature forest to scrub/shrub) during our breeding season point counts. Possibly a better indicator species for mature forest would be Acadian Flycatcher; this species was most often only found in draws in forest stands.

Letter Number 20

Indicator Species (243.02)

Response 20-1:

While the Hooded Warbler was initially considered as a Management Indicator Species (MIS) to represent mature forest, it was eliminated from further consideration through the Management Indicator Species screening process. The Pileated Woodpecker was selected as a Management Indicator Species to represent mature forest as well as snag/cavities. See Appendix F - Management Indicator Species of Final Environmental Impact Statement for additional details.

Comment 20-2:

If we understand correctly, Wood Thrush was selected in order to monitor the effectiveness of reducing edge habitats. You might consider as an alternative (or in combination) Indigo Buntings, as they are closely tied to edges. We feel that it would be appropriate to monitor the population levels of Indigo Buntings to determine the amount of edge habitat in the landscape.

Letter Number 20

Indicator Species (243.02)

Response 20-2:

Upon further discussion with Dr. Frank Moore, it was agreed that the Wood Thrush is a good indicator of large unbroken tracks of forest. However, while the Indigo Bunting is closely tied to edges, the Wood Thrust would be a better overall single indicator of large unbroken tracts of forest. Indigo Bunting population numbers would continue to be monitored through annual breeding bird surveys.

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Appendix B -
The Planning and Analysis Process

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Appendix B - The Planning and Analysis Process

B.1 The Planning Process

36 CFR Part 219.12 describes the required process for preparation, revision, or significant amendment of a forest plan. The following describes the required steps and how the National Forests in Mississippi forest plan revision process will fulfill those steps. Documents identified are in the process record.

B.1.1 Identification of Purpose and Need (CFR 219.12(b))

The current forest plan for the National Forests in Mississippi went into effect in 1985 and has been amended 18 times to date. Periodic reviews have identified numerous areas where conditions have changed since 1985. In some cases, new scientific understanding evolved, monitoring direction needed to shift to more important resource concerns, or current direction was not having the intended outcome. For other issues, there were new public priorities, and new desired conditions were needed. In recent years, restoration and maintenance of biodiversity, old growth forest habitats, and ecosystem management have gained public and scientific interest and have emerged as forest management issues. The amount of time since the implementation of the 1985 forest plan, new scientific understanding, and shifting public interests have all contributed to the need to revise the forest plan.

Public involvement in the identification of significant issues and management concerns has been a key part of the planning process. Issues identified by the public, the Forest Service, interested groups, and other state and federal agencies guided the need for change and the development of management alternatives.

In addition to issues identified through public involvement, the “USDA Forest Service Strategic Plan for Fiscal Years 2007-2012” influenced which Plan revision issues were most relevant. Local national forest management direction should be consistent with established national and regional policies, goals and objectives. Forest plan direction for the National Forests in Mississippi focused on implementation of Forest-specific direction consistent with national and regional policy and management emphasis.

The major issues driving the development of management strategies or plan alternatives were native ecosystem restoration, biodiversity and species viability, forest health, vegetation management (timber), fire management, old growth, watersheds, access management, recreation, special areas, land use and ownership, climate change, minerals, and economic benefits.

B.1.2 Planning Criteria (219.12(c))

The following are identified as planning criteria used in the development of the National Forests in Mississippi revised forest plan.

B.1.3 Laws

Alternatives should meet the intent of the Organic Administration Act and Weeks Law identifying the purpose of the National Forest to improve and protect the forest, to secure favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States.

Alternatives should meet the intent of the Multiple-Use Sustained-Yield Act of 1960 to administer the National Forest for outdoor recreation, range, timber, watershed, and wildlife and fish purposes. That these resources are utilized in the combination that will best meet the needs of the American people;

making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

Alternatives should meet the intent of the Forest and Rangeland Renewable Resources Planning Act of 1974 as amended by the National Forest Management Act of 1976 including requirements to provide for multiple use and sustained yield of the products and services obtained therefrom in accordance with the Multiple-Use Sustained-Yield Act of 1960, and, in particular, include coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness.

Alternatives should comply with the Clean Water Act, Endangered Species Act and other applicable laws. Protection of water quality to provide for current and future beneficial uses will be a high priority in all alternatives.

B.1.4 National Direction (formerly RPA Program)

The goals and objectives of the current Forest Service Strategic Plan will be addressed as applicable to the National Forests in Mississippi. These include:

Goal 1. Restore, Sustain, and Enhance the Nation's Forests and Grasslands

Objective 1.1 Reduce the risk to communities and natural resources from wildfire

Objective 1.2 Suppress wildfires efficiently and effectively

Objective 1.3 Build community capacity to suppress and reduce losses from wildfires

Objective 1.4 Reduce adverse impacts from invasive and native species, pests, and diseases

Objective 1.5 Restore and maintain healthy watersheds and diverse habitats

Goal 2. Provide and Sustain Benefits to the American People

Objective 2.1 Provide a reliable supply of forest products over time that (1) is consistent with achieving desired conditions on National Forest System lands and (2) helps maintain or create processing capacity and infrastructure in local communities

Objective 2.3 Help meet energy resource needs.

Goal 4. Sustain and Enhance Outdoor Recreation Opportunities

Objective 4.1 Improve the quality and availability of outdoor recreation experiences

Objective 4.2 Secure legal entry to national forest lands and waters

Objective 4.3 Improve the management of off-highway vehicle use

Goal 5. Maintain Basic Management Capabilities of the Forest Service

Objective 5.1 Improve accountability through effective strategic and land management planning and efficient use of data and technology in resource management

Objective 5.2 Improve the administration of national forest lands and facilities in support of the agency's mission

B.1.5 Public Issues and Management Concerns

The alternatives will be developed and analyzed with consideration for the public issues, management concerns, and resource use and development opportunities identified and described in the purpose and need. (See chapter 1 of the FEIS and appendix A for more information.)

B.1.6 Other Plans

The alternatives will be developed and analyzed with consideration for the plans and programs of other Federal and State agencies, local governments, and Indian tribes. The responsible official will review these programs and plans to determine how the National Forests in Mississippi forest plan may complement or find consistency with these other plans.

B.1.7 Ecological Factors

The management actions needed to restore, sustain, and/or enhance the composition, structure, and function of the ecological communities within the national forest will be considered in developing the alternatives. The potential effects of climate change will be considered in developing and analyzing the alternatives.

B.1.8 Social Factors

Alternatives will consider the effects of different management strategies on the local communities.

B.1.9 Economic Factors

Budget constraints based on past funding trends will be used in the development of desired conditions and objectives to provide meaningful measures that can reasonably be expected. The resulting plan shall provide for multiple use and sustained yield of goods and services from the national forest in a way that maximizes long term net public benefits in an environmentally sound manner.

B.1.10 Resource Integration

During the forest planning process, lands which are not suited for timber production shall be identified in accordance with the criteria in Sec. 219.14.

The methods, timing, and intensity of vegetation management practices shall be defined in the forest plan with applicable standards and guidelines and associated outcomes in the form of goals, desired conditions, and objectives.

The allowable sale quantity of timber that may be sold each decade will be established for each alternative.

Unless otherwise provided by law, roadless areas within the National Forest System shall be evaluated and considered for recommendation as potential wilderness areas.

Direction shall be provided for the management of designated wilderness and primitive areas.

Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. Each alternative shall establish objectives that would help maintain or improve habitat for management indicator species.

A broad spectrum of outdoor recreation opportunities shall be provided for in each alternative. The identification of recreation opportunities will include an updated inventory of recreation opportunity spectrum classification. The scenery management system will be used in planning to identify visual resources and guide management of these resources. The alternatives will provide a diversity of recreation opportunities including motorized and nonmotorized recreation.

Mineral exploration and development in the planning area shall be considered in developing alternatives. General suitability for minerals and energy development will be established. Private mineral rights will be considered in all decisions made in the planning process.

The alternatives shall provide for protection and management of the water and soil resources. Important water uses will be identified.

The alternatives shall provide for the identification, protection, interpretation, and management of significant cultural resources on the national forest. Planning for the resource shall be governed by the requirements of Federal laws pertaining to historic preservation. Interactions with other multiple uses will be considered and impacts analyzed.

The list of unique or important forest, aquatic, or geologic types needed to complete the national network of research natural areas will be checked to ascertain if any potential missing research natural area types are located on the National Forests in Mississippi.

The alternatives shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. The interdisciplinary team shall consider how diversity will be affected by various mixes of resource outputs and uses, including proposed management practices. The diversity analysis should be based on processes readily identifiable with other state or national systems, such as NatureServe. The analysis will address both ecosystem and species diversity.

The minimum management requirements for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, soil and water, and diversity shall be incorporated into the objectives, standards and guidelines in each alternative.

B.1.11 Inventory data and information collection (219.12(d))

The following are examples of data and information sources used in the planning and analysis process for the National Forests in Mississippi revised forest plan and environmental impact statement (EIS):

- Stand examination inventory data collected in the field is entered into our corporate database for tracking overstory vegetation with fields of information such as forest type, stand age, condition, and acres. Our current GIS (geographic information system) utilizes ArcGIS, which links to our FSVeg tabular database.
- Other types of inventory data collected and entered into corporate databases and our GIS include roads and trails and conditions, recreation sites and conditions, archeological sites, stream networks, certain wildlife habitats, fire history, digital elevation, and land ownership.
- Federal and State agency, local government and tribal websites are a source of information about other programs and plans, lists of rare species and occurrence records, some economic information, forest health information, soil and water information.
- The National Forests in Mississippi adopted the National Hierarchical Framework of Ecological Units as a consistent nationwide classification system to describe similar ecosystems for planning purposes. This framework provides a standardized method for classifying, mapping, and describing ecological

units at various geographic, planning and analysis scales. Ecological units across the U.S. are mapped based on patterns of climate, soils, hydrology, geology, landform, and topography. These classifications represent homogeneous units having similarities among their resource capabilities and relationships.

- Place based knowledge and information is contributed by participants in the collaborative planning process.
- U.S. Census Bureau data is used to summarize demographics and some economic information.
- Citations listed in the References chapter provide additional information including the best available scientific information in regard to specific analysis topics.

B.1.12 Analysis of the Management Situation (219.12(e))

The analysis of the management situation is a determination of the ability of the planning area covered by the forest plan to supply goods and services in response to society's demands. Benchmarks define the range within which alternatives can be constructed and include: (1) the minimum level of management; and (2) the maximum physical and biological production potentials. A maximum present net value benchmark is also discussed in the section below. As was mentioned in the Purpose and Need section above, the development of alternatives focused on ecosystem restoration and increasing biological diversity. The present net values calculated for ecosystem management prescriptions generally were lower for restoration prescriptions. This was because the cultural treatments to reestablish desired vegetation were more costly and the rotation lengths for longleaf and shortleaf were longer.

When considered along with the current level of goods and services provided, projections of demand, a determination of the potential to resolve public issues and management concerns, and considering the data and information available, this provides a basis for determination of the need for change.

More details of the analysis of the management situation can be found in the following documents:

Section B.2 of this appendix (B) Timber Resource Program, Suitability and Sustainability Analysis.

Appendix C Analysis of Potential Wilderness and Wild and Scenic River Segments

Appendix D Special Areas, Status, Trends, and Strategies

Appendix E Watershed Analysis

Appendix F Management Indicator Species (MIS) Review

Appendix G Ecosystem and Species Diversity Report

Appendix H Unit Analysis for Ecological Systems occurring on multiple Units

Forest-wide Roads Analysis Report

Timber Program Suitability and Sustainability Analysis

Guidance for Conserving and Restoring Old-Growth Forest Communities

B.1.13 Formulation of Alternatives (219.12(f))

A range of alternative plan contents are expressed and considered in the process of formulating a proposed plan. The process of developing this proposed plan and alternatives focused first on defining

common ground among the interested parties and narrowing the initially broad possibilities for plan content to those elements generally agreeable to most participants in the planning process.

In addition to issues identified through public involvement, the "USDA Forest Service Strategic Plan for Fiscal Years 2007-2012" influenced which Plan revision issues were most relevant. Forest plan direction for the National Forests in Mississippi focused on implementation of Forest-specific direction consistent with national and regional policy and management emphasis.

The major issues driving the development of management strategies or plan alternatives were native ecosystem restoration, biodiversity and species viability, forest health, vegetation management (timber), fire management, old growth, watersheds, access management, recreation, special areas, land use and ownership, climate change, minerals, and economic benefits.

Benchmark Analysis

Benchmark analysis was used to approximate maximum economic and biological resource production opportunities. Also, minimum management levels were analyzed to set a lower bound for Forest management. These benchmarks are useful in evaluating the compatibilities and conflicts between different resource objectives and defining the range within which integrated alternatives could be developed.

Minimum Level of Management Benchmark

This benchmark represents the minimum level of management needed to maintain and protect the National Forests in Mississippi as part of the National Forest System. This level of management does involve some activities and costs in order to meet the following minimum requirements.

- Protect the life, health, and safety of incidental users;
- Prevent environmental damage to the land or resources of adjoining lands of other ownerships or downstream users;
- Conserve soil and water resources;
- Prevent significant or permanent impairment of the productivity of the land; and
- Administer unavoidable non-Forest Service special uses and mineral leases, licenses, permits, contracts, and operating plans.

This benchmark was developed as alternative A (custodial management alternative). This developed the scenario for management of legal requirements at the lowest feasible funding level.

The legal requirements for the National Forests in Mississippi include management of Threatened and Endangered Species. Therefore this alternative included the habitat management necessary to maintain the red cockaded woodpecker and gopher tortoise populations on the Forest. This focused the timber and burning programs on the Bienville, DeSoto and Homochitto National Forests. This would allow for a core capability in these program areas to respond to catastrophic natural events Forest wide.

Current Level of Management Benchmark

This benchmark is the same as the no-action alternative, which is described in this environmental impact statement as alternative B. Current level of management reflects the program management levels that result from current of budget trends. These budget levels were also used to identify the level of resource management projected in the proposed action alternative.

Maximum Level of Timber Production Benchmark

Maximum timber production was modeled as maximum biological potential using the Excel spreadsheet model described later in the Timber Resource Program, Suitability and Sustainability section introduction below. The maximum physical and biological production potential benchmark was not developed as an alternative because the funding and staffing resources were not likely to be available to achieve that level of outputs. This benchmark maximized timber production within the same biological constraints applied to all alternatives. However it was not limited based on budget and staffing capabilities.

The resulting timber yields would be a departure over long term sustained yields in the first three decades. Then volumes would fall below long term sustained yields in decades 4 and 5. This departure would be caused by the heavily accelerated harvest of very productive loblolly and slash pine forests for restoration to slower growing longleaf and slash pine and hardwood forests managed at lower densities and longer rotations when the desired condition is attained.

Table B 1. Timber sale program quantity for all products by decade

Million Cubic Feet/Decade				
Decade 1	**Decade 2**	**Decade 3**	**Decade 4**	**Decade 5**
557	431	386	279	267
Long-Term Sustained Yield = 307 MMCF per Decade				

Maximum Present Net Value Benchmark

Financial efficiency is defined as how well the dollars invested produce revenues to the agency. Economic efficiency is defined as how well the dollars invested produce benefits to society. Present net value (PNV) is used as an indicator of financial and economic efficiency.

An Excel spreadsheet was used to calculate the present net value over a 50-year period. A 4 percent discount rate was used. Decadal and 50 year cumulative present values for program benefits and costs as well as present net values are the product of this spreadsheet. For each decade, an average annual resource value was estimated, multiplied by 10 years, and discounted from the mid-point of each decade.

The revenue values for timber were the values described in the timber suitability analysis section. The estimates of recreation visitors were derived from the National Visitor Use Monitoring (NVUM) Report for the National Forests in Mississippi, which was updated in 2009. The benefit values for the recreation visits came from research conducted by the Southern Research Station. (A recreation “visit” is defined as the entry of one person onto a national forest site or area to participate in recreation activities for an unspecified period of time. This site visit ends when the person leaves the site or area for the last time.)

Table B 2 displays the economic values that were used in the present net value analysis for each recreation activity.

A “maximum present net value” benchmark would represent the combination of management activities that would create the greatest difference between the discounted revenues or benefit values compared to the discounted costs. In comparing the economic values of the uses of the National Forests in Mississippi, recreation (and wildlife-related recreation) provides the majority of the total estimated discounted benefits. So a management scheme that would “maximize” the recreation potential on the National Forest, and specifically one that would emphasize bicycling, horseback riding and hunting activities, would need to be enacted to “maximize” the present net value on the Forest.

Table B 2. Present net values for recreation activities

Recreation Activity	Description	Value/Visit
Camping	Camping at a developed recreation site	$51.26
Driving	Motorized recreation including driving for site seeing and motorized boating activities	$43.84
General	Generalized recreation including just relaxing, swimming, and non-specific forest recreation	$80.03
Hiking	Hiking	$51.26
Nature/Historical	Nature based activities including special forest gathering, historical site visit, nature study visit, and nature study	$51.26
Off-Highway Vehicles	Off-Highway Vehicle activities including three/four wheelers and motorcycles	$51.26
Primitive Camping/ Wilderness	Primitive camping (using undeveloped sites) and backpacking	$76.10
Picnicking	Picnicking	$90.55
Trails	Trail use including bicycling, horseback riding and non-motorized water activities such as canoeing	$205.34
Viewing Scenery/ Viewing Wildlife	Nature viewing and wildlife viewing	$60.01
Hunting	Hunting	$140.53
Fishing	Fishing	$45.96

Source: J. Michael Bowker, et. al., Estimating the Net Economic Value of National Forest Recreation: An Application of the National Visitor Use Monitoring Database, FS-09-02, September 2009, The University of Georgia.

Note: The values were originally reported in 2004 dollars, and were updated to 2010 dollars using the GDP Price Deflator from the US Department of Commerce, Bureau of Economic Analysis.

For a benchmark that would "maximize present net value using market values only", the recreation and wildlife benefit values disclosed above would not be used since they are not market values (i.e., values representing money exchanged in a market place). Instead, the fees received from developed recreation areas and campgrounds, and the monies paid for hunting and fishing permits would be the "values". So, under this form of management, developed recreation and campground opportunities would be maximized, along with hunting and fishing opportunities. Also, since timber management results in "returns to the treasury", timber production would be a part of this benchmark. The timber management that would contribute the most toward maximizing present net value would be the management described in the maximum biological potential program described in the maximum timber production benchmark described above.

Since the purpose of a benchmark is to identify the range within which integrated alternatives can be developed, it was felt that an attempt to speculate and quantify exactly what a "maximum" level of recreation uses might be for these benchmarks would not be very useful. However, it is important to identify the types of management emphases that would be conducted under such "benchmark" forms of management to help facilitate the identification of a range within which alternatives can be developed.

For the alternatives, recreation, wildlife, and timber outputs were estimated and a present net value of each alternative determined. In estimating the present net value for the alternatives, the costs used were derived from recent Forest budgets for all the program areas on the National Forests. The unit costs were then applied to the outcome levels for each alternative. Table B 3 shows the present net values for the alternatives.

Table B 3. Present net values of costs and benefits in millions of dollars (2010) for the alternatives

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Cumulative Total Present Net Value	$3,004,322	$5,556,813	$6,109,475	$6,049,826	$6,041,772
Present Value Benefits by Program:					
Range	$0	$0	$0	$0	$0
Timber	$75,374	$120,431	$179,981	$202,576	$235,579
Minerals	$73,384	$73,384	$73,384	$73,384	$73,384
Recreation	$1,278,868	$2,218,825	$2,411,057	$2,411,057	$2,411,057
Wildlife:	$2,244,271	$3,929,540	$4,266,602	$4,266,602	$4,266,602
Total PV of Benefits	$3,671,897	$6,342,181	$6,931,023	$6,953,618	$6,986,622
Present Value Costs by Program:					
Range:	$87	$109	$109	$131	$131
Timber:	$108,128	$127,198	$133,075	$146,376	$153,038
Roads/Engineering	$183,275	$215,602	$225,551	$248,126	$259,402
Minerals:	$6,313	$7,423	$7,750	$8,534	$8,925
Recreation	$39,729	$46,739	$48,894	$53,792	$56,230
Wildlife:	$63,087	$74,211	$77,629	$85,401	$89,276
Soil, Water, Air..	$15,064	$17,720	$18,526	$20,376	$21,312
Protection/Forest Health	$218,802	$257,421	$269,285	$296,236	$309,689
Lands	$15,826	$18,634	$19,483	$21,443	$22,422
Planning, Inv., Monitoring	$17,263	$20,311	$21,247	$23,380	$24,425
PV Costs	$667,575	$785,368	$821,549	$903,793	$944,850

Alternatives Analyzed

The alternatives were developed within the benchmarks. Alternative A (custodial management) was developed to analyze the minimum level of management. Alternative B (no-action) was developed to analyze the continuation of current management level. Alternative C (proposed action) was developed to analyze an alternative that could be implemented with the organization available if adequately funded. Alternatives A through C had similar overall desired conditions with shifts in implementation strategy and program priorities due to funding levels. Alternative D and E were added to analyze not only additional funding and program levels but shifts in emphasis from restoration in alternative D (accelerated restoration) to forest health in alternative E (enhanced forest health).

B.1.14 Estimated Effects of Alternatives (219.12(g))

The estimated effects of the alternatives are described in chapter 4 of this document. Some of the more pertinent effects and outcomes are displayed in tables at the end of chapter 2.

B.1.15 Evaluation of Alternatives (219.12(h))

The ID Team compared the aggregate effects of the alternatives with regard to physical, biological, economic, and social impacts, outputs of goods and services, and overall protection and enhancement of the environment.

B.1.16 Preferred Alternative (219.12(i))

For the Draft Environmental Impact Statement, the Forest Supervisor reviewed the ID Team's evaluation and recommended to the Regional Forester that alternative C be considered the preferred alternative; which was displayed as the Draft Revised Plan.

B.1.17 Plan Approval (219.12(j))

The Regional Forester reviewed the proposed revised plan and Final EIS and selected Alternative C. The rational for this selection is documented in the Record of Decision.

B.1.18 Monitoring and Evaluation ((219.12(k))

Monitoring requirements are identified in the revised plan to evaluate on a sample basis how well implementation is adhering to plan direction. (Refer to Chapter 5 of the Revised Forest Plan.)

B.2 Timber Resource Program, Suitability and Sustainability Analysis

B.2.1 Introduction

Vegetation management practices envisioned in the revised plan for the National Forests in Mississippi (Forests) support restoration of native ecological systems, improve conditions for threatened and endangered species, and improve forest health. These ecological restoration objectives are based on the desired future conditions described in part 1 of the revised plan. The desired conditions of the plan are based on the analysis described in the ecosystem diversity report and the species diversity report included in the planning record. An ecological sustainability evaluation model was used to consider conditions needed for ecological sustainability, and species diversity and sustainability.

The results of the ecological sustainability evaluation model emphasized restoration of longleaf, shortleaf and hardwoods forest wide on appropriate sites. Restoration of prairies on the Bienville District was identified as high priority. Restoration of bogs and savannahs in the near coast flatwoods on the De Soto District were also considered a priority. In areas identified as red-cockaded woodpecker habitat management areas, and suitable soils for gopher tortoise, thinning to achieve optimal habitat conditions was deemed highest priority. As program level allowed, other projects addressing forest health and general habitat conditions were identified as needed.

The changes in vegetation species composition, condition and age were modeled using an excel spreadsheet. Formulas were entered which moved 2006 acres entered by vegetation type and age in ten year increments. The formulas accounted for acres modeled to change vegetation types due to restoration treatments. The assumptions used in the modeling of vegetation treatments and harvest volumes were deemed to be biologically attainable by the interdisciplinary team developing the plan strategy. Likely outcomes for the plan were attained by tempering the biologically attainable vegetation program by applying treatment priorities and program constraints (budget) to the model. Because of this, system age and application of effective rotation lengths were unimportant factors. The likely vegetation program should be predominantly thinning and system restoration harvests. The restoration harvests are likely to be predominantly clearcuts artificially regenerated. Other regeneration will be predominantly harvest methods aimed at natural regeneration (seed tree and shelterwood).

Table B 4displays the relationship between ecological systems used in the ecological sustainability evaluation model and the vegetation management model. For more details on the forest type composition of the vegetation modeling groups, see the section titled "Vegetation Management Model Silvicultural

Assumptions and Parameters" of the Timber Resource Program, Suitability, and Sustainability Analysis Report.

Table B 4. Relationship between ecological systems used in modeling

Ecological System	Vegetation Modeling Group
Upland Longleaf Pine Forest and Woodland	Longleaf Pine
Shortleaf Pine-Oak Forest and Woodland	Shortleaf Pine
Loblolly Pine Forest, Southern Loblolly-Hardwood Flatwoods	Upland Loblolly Pine
	Mesic Loblolly Pine
Slash Pine Forest	Slash Pine
Northern Dry Upland Hardwood Forest	Northern Dry Upland Hardwood
Southern Dry Upland Hardwood Forest	Southern Dry Upland Hardwood
Southern Loess Bluff Forest	
Southern Mesic Slope Forest	Southern Mesic Hardwood
Northern Mesic Hardwood Forest	Northern Mesic Hardwood
Floodplain Forest	Floodplain Forest
Lower Mississippi River Bottomland & Floodplain Forest	Lower Mississippi River Bottomland & Floodplain Forest
Near-Coast Pine Flatwoods	Near-Coast Pine Flatwoods

The Timber Resource Program, Suitability, and Sustainability Analysis Report included in the planning record is a summary of analysis of the suitability of National Forests in Mississippi forest lands for timber production and harvest under the revised forest plan. The analysis also provides estimates of the timber sale program quantity and the long-term sustained-yield capacity of these lands. Timber sale program quantity is the quantity of timber that is likely to be removed by revised plan implementation. Long-term sustained-yield capacity calculations are based on the amount of timber that could be harvested assuming the desired conditions were achieved and the silvicultural management strategy for the desired condition was being implemented. This estimate was based on the amount of timber that could be removed in perpetuity on an annual basis.

Long-term sustained-yield capacity and timber sale program quantity are estimates achieved by use of the excel spreadsheet model mentioned above. Timber sale program quantity is aspirational in nature, rather than being a commitment to offer certain levels of volume at any given time. The timber sale program anticipates silvicultural activities which are analyzed and selected through National Environmental Policy Act (NEPA) process decisions which implement the revised plan. These timber sale projects apply active management to the vegetative resource in order to move the forest toward desired conditions (see part 1 of the forest plan). Silvicultural activities described in the Timber Resource Program, Suitability, and Sustainability Analysis Report include commercial timber sales of intermediate timber harvesting (thinning, seed tree removal), and harvest treatments that are even-aged in nature (clearcut, shelterwood, seedtree), two-aged regeneration (shelterwood or seed tree with reserves), or uneven-aged (group selection). The size of the vegetation management program (acres of management activities) has been determined by the ecological needs of the resource, tempered by the historical budget and personnel levels (physical capability) for the National Forests in Mississippi.

The excel spreadsheet model reflects the changes in vegetation types, ages and condition through five decades of vegetation management to achieve the forest plan desired conditions. This spreadsheet model included format and formulas to calculate acres of treatment and resulting volumes. The volume tables included in this model were based on experienced volume yields and professional judgment. The

experienced volumes were a sampling of volumes from actual timber sales over many years. These volumes were recorded by forest type, age, and timber harvest prescription. The results were averaged on a per acre basis for prescribed harvest stand acres. These averages were entered into the excel model as well as estimates for harvest at combinations of forest type, age, and prescription; for which there was no harvests in past contracts and used to calculate volume outcomes. The section below describing anticipated changes and treatments provides likely outcomes in acres for each district and vegetation classification based on this model.

Ecological restoration has been the primary management emphasis through the forest plan revision process. Improved forest health will also be achieved through implementation of ecological restoration projects. The timber sale activities described above will yield wood products to the commercial markets in the form of pulpwood, sawtimber and biomass fuels.

B.2.2 Suitability

Stage 1: Lands Tentatively Suitable for Timber Production

The suitability determinations used in plan revision are based on land classifications contained in the Forest Service FSVeg forest vegetation database as of 2006. These classifications have been updated through inventories and project decisions made over the last several decades.

Most of the land base on the National Forests in Mississippi (97 percent) is considered tentatively suitable for timber production. Exceptions to that include areas administratively or congressionally withdrawn from such practices and non-forest land. The remainder of the land base is considered tentatively suitable for timber production.

The tables in section B.2.3 below summarize acres for the timber land classification categories based on 2006 data. These land classifications are subject to change based on field inventory and subsequent classifications.

Stage 2: Timber Suitability – Economic Analysis

Table B 5 shows the present net value for silvicultural management alternatives in each ecological system / vegetation type. These silvicultural management alternatives represent a range of management intensities or ways to attain different desired conditions. Present net value is the difference between the discounted revenues and discounted costs, using a 4 percent rate. The present net values presented do not indicate the need to categorize any areas as not cost-efficient in meeting forest plan objectives, which include timber production.

Table B 5. Present net value (PNV) of silvicultural management alternatives by ecological system[a]

Silvicultural Management	PNV/Acre
Upland Loblolly	
Even Aged Shortleaf Restoration	$828
Even Aged	$504
Un-even aged	$421
Irregular Even Aged	$117
Even Aged Longleaf Restoration Short Rotation (HMA)	$-109
Even Aged Longleaf Restoration Long Rotation (HMA)	$-348
Mesic Loblolly	
Even Aged Hardwood Restoration	$463
Un-even aged	$360
Even Aged	$308
Irregular Even Aged HMA Short Rotation	$229
Irregular Even Aged HMA Long Rotation	$73
Slash	
Even Aged Longleaf Restoration Long Rotation (HMA)	$367
Un-even aged	$307
Irregular Even Aged	$113
Even Aged	$-99
Even Aged Longleaf Restoration Short Rotation (HMA)	$-126
Flood Plain Slash	
Un-even aged	$767
Even Aged	$705

Silvicultural Management	PNV/Acre
Shortleaf	
Irregular Even Aged	$20
Un-even aged	$-67
Even Aged	$-273
Even Aged Woodland	$-332
Longleaf	
Irregular Even Aged Woodland	$139
Un-even aged	$-21
Even Aged Woodland	$-126
Irregular Even aged	$-282
Even Aged	$-413
Dry Upland Hardwood	
Un-even aged	$308
Irregular Even aged	$84
Irregular Even Aged Woodland	$-85
Mesic Hardwood	
Un-even aged	$312
Irregular Even aged	$133
Floodplain Hardwood	
Un-even aged	$285
Irregular Even aged	$132
Mississippi River Floodplain Hardwood	
Un-even aged	$-21
Irregular Even aged	$-79

a - See Timber Resource Program Suitability and Sustainability Analysis planning process record for a description of the different silvicultural management options considered.

The present net value calculations above used the historical timber sale revenues, timber management costs, road costs and road factors shown in Table B 6.

Table B 6. Revenues

Forest Product	Range $ / CCF[a]	Weighted Average $ / CCF
Pine Sawtimber	$55.43 – $105.14	$77.90
Pine Pulpwood	$8.37 - $35.79	$16.66
Hardwood Sawtimber	$33.32 - $60.97	$45.57
Hardwood Pulpwood	$2.00 - $38.17	$14.15

a – CCF – hundred cubic feet

- Timber management costs:
    - Sale preparation or administration - $20.79 / ccf
    - Site preparation – range $56.00 – 665.89 per acre; average $245.18 per acre
    - Planting – range $259.00 - $316.00 per acre
    - Stocking surveys - $14.00 - $28.00 per acre
    - Release - $185.00
    - Non-commercial thinning - $410.00
    - Prescribed fire – $56.00
- Road costs and factors
    - Road construction - $0.00
    - Road reconstruction - $21,210.00
    - Road maintenance – $743.00
    - Average miles road constructed per acre harvested - 0.0
    - Average miles road reconstructed per acre harvested - 0.002034 miles per acre
    - Average miles road maintained per acre harvested - 0.002034 miles per acre

Stage 3: Identification of Lands Suitable for Timber Production

The tentative classifications were reviewed prior to plan revision analysis for accuracy and appropriateness given the desired conditions for the various forest ecosystem vegetation types. As a result of this review, acres in the near coast flatwoods system were modeled as not appropriate for timber production. Timber production is not compatible with the open woodland savanna and bog desired condition of these sites. Most of these areas were classed as suitable for timber production under the 1985 Land and Resource Management Plan for the National Forests in Mississippi.

Areas identified on the National Forests in Mississippi preliminary list of possible old growth have been modeled as not appropriate for timber production as well, if they were not already in that category. This was done because there would be no intent to schedule harvesting these stands for regeneration. They may be harvested when project level decisions identify the areas are not providing desired old growth character or finds the sites more important for restoration than old growth character when the species occurring are not deemed site appropriate.

Areas have also been identified as not suitable for timber production during past inventories due to site characteristics, uses, barriers to management or red-cockaded woodpecker management guides.

There have also been areas nominated for special area designation and reviewed for appropriateness for the designation. The nominated areas deemed appropriate for further consideration for designation were placed in a Deferred Withdrawn (400) Land Class. The plan alternatives which move most of these designations forward will allow them to be moved to Reserved Withdrawn (300) Land Class. Both 400 and 300 Land Class designations are Unsuitable for Timber Production. Two of the deferred withdrawn areas (See the EIS section 3.5.5 discussion of the 186 acre Lee Creek Proposed Research Natural Area and the 80 acre Singleton Prairie Proposed Botanical Area for rationale) were dropped from further consideration. These were dropped from all alternatives. Therefore each alternative analyzed, utilizes the same allocation of acres to the land base Suitable for timber management.

As can be seen in Table B 7, most of the land base on the National Forests in Mississippi (81 percent) is considered suitable for timber production after identifying lands not appropriate for timber production.

Table B 7 quantifies lands that are suitable for timber production and those lands that are not appropriate for timber production. There is a timber land classification map included in the planning record. This map displays areas where timber harvesting activities could occur.

Table B 7. Lands suitable and unsuitable for timber production by Forest

National Forests in Mississippi								
	Bienville NF	**DeSoto NF DeSoto RD**	**DeSoto NF Chickasaw-hay RD**	**Homochitto NF**	**Delta NF**	**Holly Springs NF**	**Tombigbee NF**	**National Forests in Mississippi Totals**
Classification	**Approx. Acres**							
Total National Forest System Land	**178,541**	**368,218**	**150,369**	**191,842**	**60,898**	**155,661**	**67,005**	**1,172,524**
Non-forest lands	1603	9,368	291	2,960	1,701	1,979	924	18,826
Lands that have been withdrawn from timber production	242	11,169	690	228	711	186	1,200	14,426
Lands where technology is not available to ensure timber production would not cause irreversible resource damage								
Lands where there is no reasonable assurance they can be adequately restocked								
Lands Tentatively Suitable for Timber Production	**176,696**	**347,681**	**149,388**	**188,654**	**58,486**	**153,496**	**64,881**	**1,139,272**
Lands where timber production is not compatible with achieving desired conditions and objectives (Lands not appropriate for timber production)	21,748	97,728	10,117	16,585	21,156	12,056	5,627	185,017
Lands Suitable for Timber Production	**154,948**	**249,953**	**139,271**	**172,069**	**37,330**	**141,440**	**59,254**	**954,255**
Lands Not Suitable For Timber Production	**23,593**	**118,265**	**11,098**	**19,773**	**23,568**	**14,221**	**7,751**	**218,269**

B.2.3 Estimated Vegetation Management Practices

Table B 8 - Table B 17 show estimated acres of harvests for vegetation treatment to implement the plan objectives and priorities for the first two decades under five alternatives. These estimates are displayed by district. These likely program acres are provided in the tables below for lands suitable for timber production, or where timber harvests are needed to meet other resource objectives on lands not suitable for timber production.

Table B 8. Estimated vegetation management practices alternative A (custodial) (likely accomplishments for first decade)

Practice	Acres By District							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	288	279	494					1,061
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning	28,202	16,934	14,896			17,567		77,599
Salvage /Sanitation								
Other Harvest								
Subtotal Acres	28,490	17,213	15,390	0	0	17,567	0	78,660
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			73					73
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			125					125
Salvage /Sanitation								
Other Harvest								
Subtotal Acres	0	0	198	0	0	0	0	198
Grand total Acres	28,490	17,213	15,588	0	0	17,567	0	78,858

Table B 9. Estimated Vegetation management practices alternative A (custodial) (likely accomplishments for second decade)

Practice	Acres By District							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	288	294	555					1137
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning	27067	23,602	20795			17,656		89,120
Salvage /Sanitation								
Other Harvest								
Subtotal Acres	27,355	23,896	21,350	0	0	17,656	0	90,257
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			116					116
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			319					319
Salvage /Sanitation								
Other Harvest								
Subtotal Acres	0	0	435	0	0	0	0	435
Grand total Acres	27,355	23,896	21,785	0	0	17,656	0	90,692

Table B 10. Estimated vegetation management practices alternative B (no action) (likely accomplishments for first decade)

Practice	Acres By District							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)		981	4,746	177	3,794	4,543	1,854	16,095
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning	17680	23,977	14,909	5,079	6,789	23,807	4,862	97,103
Salvage /Sanitation								
Other Harvest	531							531
Subtotal Acres	18,211	24,958	19,655	5,256	10,583	28,350	6,716	113,729
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			79					79
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			184					184
Salvage /Sanitation								
Other Harvest	33							33
Subtotal Acres	33	0	263	0	0	0	0	296
Grand total Acres	18,244	24,958	19,918	5,256	10,583	28,350	6,716	114,025

Table B 11. Estimated vegetation management practices alternative B (no action) (likely accomplishments for second decade)

Practice	Acres By District							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	52	1,701	4,250	951	3,571	5,030	2,204	17,759
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning	17,290	25,304	16,762	4,576	6,672	23,283	4,296	98,183
Salvage /Sanitation								
Other Harvest	267							267
Subtotal Acres	17,609	27,005	21,012	5,527	10,243	28,313	6,500	116,209
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			82					82
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning		504	229					733
Salvage /Sanitation								
Other Harvest	14							14
Subtotal Acres	14	504	311	0	0	0	0	829
Grand total Acres	17,623	27,509	21,323	5,527	10,243	28,313	6,500	117,038

Table B 12. Estimated vegetation management practices alternative C (proposed action) (likely accomplishments for first decade)

Practice	Acres By District							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)		1,558	6,530	1,357	5,712	6,898	3,008	25,063
Uneven-aged Management							83	83
Intermediate Harvest								
Commercial Thinning	27,295	29,786	22,788	6,496	10,626	36,284	7,433	140,708
Salvage /Sanitation								
Other Harvest	799							799
Subtotal Acres	28,094	31,344	29,318	7,853	16,338	43,182	10,524	166,653
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)					160			160
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			408		70			478
Salvage /Sanitation								
Other Harvest	51		1,117					1168
Subtotal Acres	51	0	1,525	0	230	0	0	1806
Grand total Acres	28145	31,344	30,843	7,853	16,568	43,182	10,524	168,459

Table B 13. Estimated vegetation management practices alternative C (proposed action) (likely accomplishments for second decade)

Practice	Acres By District							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	1,109	2,113	6,727	1,212	5,835	8,945	3,020	28,961
Uneven-aged Management							80	80
Intermediate Harvest								
Commercial Thinning	24,810	33,133	27,216	7,535	10,359	41,277	7,542	151,872
Salvage /Sanitation								
Other Harvest								
Subtotal Acres	25,919	35,246	33,943	8,747	16,194	50,222	10,642	180,913
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			1092		107			1199
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			441		85			526
Salvage /Sanitation								
Other Harvest								
Subtotal Acres	0	0	1533	0	192	0	0	1,725
Grand total Acres	25,919	35,246	35,476	8,747	16,386	50,222	10,642	182,638

Table B 14. Estimated vegetation management practices alternative D (accelerated restoration) (likely accomplishments for first decade)

Practice	Acres By District							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)		4,373	9,694	1,357	10,683	11,419	5,359	42,885
Uneven-aged Management							82	82
Intermediate Harvest								
Commercial Thinning	33,785	19,030	18,722	6,496	8,653	26,775	3,752	117,213
Salvage /Sanitation								
Other Harvest	1211							1211
Subtotal Acres	34,996	23,403	28,416	7,853	19,336	38,194	9,193	161,391
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			901		98			999
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning		249	1186					1435
Salvage /Sanitation								
Other Harvest	47							47
Subtotal Acres	47	249	2,087	0	98	0	0	2,481
Grand total Acres	35,043	23,652	30,503	7,853	19,434	38,194	9,193	163,872

Table B 15. Estimated vegetation management practices alternative D (accelerated restoration) (likely accomplishments for second decade)

Practice	Acres By District							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	4103	3,702	8,117	1,212	9,554	13,463	4,455	44,606
Uneven-aged Management							49	49
Intermediate Harvest								
Commercial Thinning	18,767	24,238	30,065	7,535	9,447	27,171	5,279	122,502
Salvage /Sanitation								
Other Harvest								
Subtotal Acres	22,870	27,940	38,182	8,747	19,001	40,634	9,783	167,157
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			765		84			849
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning		430	1289		11			1,730
Salvage /Sanitation								
Other Harvest								
Subtotal Acres	0	430	2,054	0	95	0	0	2,579
Grand total Acres	22,870	28,370	40,236	8,747	19,096	40,634	9,783	169,736

Table B 16. Estimated vegetation management practices alternative E (enhanced forest health) (likely accomplishments for first decade)

Practice	Acres By District							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)		1,558	4,874	1,357	14,095	8,741	3,008	33,633
Uneven-aged Management							83	83
Intermediate Harvest								
Commercial Thinning	43,335	29,786	50,047	6,496	16,648	32,725	7,433	186,470
Salvage /Sanitation								
Other Harvest	1,178							1178
Subtotal Acres	44,513	31,344	54,921	7,853	30,743	41,466	10,524	221,364
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			57		98			160
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			1,097					478
Salvage /Sanitation								
Other Harvest	47		99					1168
Subtotal Acres	47	0	1,253	0	98	0	0	1806
Grand total Acres	44,560	31,344	56,174	7,853	30,841	41,466	10,524	222,762

Table B 17. Estimated vegetation management practices alternative E (enhanced forest health) (likely accomplishments for second decade)

Practice	Acres By District							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	2916	2,113	6,530	1,357	13,705	7,742	3,613	37,976
Uneven-aged Management							88	88
Intermediate Harvest								
Commercial Thinning	34,081	33,133	33,133	6,496	14,736	37,012	10,033	168,624
Salvage /Sanitation								
Other Harvest								
Subtotal Acres	36,997	35,246	39,663	7,853	28,441	44,754	13,734	206,688
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)					84			84
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			408		11			419
Salvage /Sanitation								
Other Harvest			1,117					1,117
Subtotal Acres		0	1,525	0	95	0	0	1,525
Grand total Acres	36,997	35,246	41,188	7,853	28,536	44,754	13,734	208,213

B.2.4 Allowable Sale Quantity (ASQ); Timber Sale Program Quantity (TSPQ); Culmination of Mean Annual Increment (CMAI)

Table B 18 through Table B 27 show the estimated outputs (MMBF - million board feet, and MMCF - million cubic feet) from the harvesting described in the previous section for the first two decades of plan implementation for five alternatives. The allowable sale quantity (ASQ) is the maximum volume that can be harvested on lands suitable for timber production over the first decade. The ASQ is based on the amount of timber harvest scheduled for removal from acres suitable for timber production in the first decade from the selected alternative. The timber sale program quantity (TSPQ) is the volume harvested from lands suitable for timber production, along with the estimate of volume harvested to meet other resource objectives on lands not suitable for timber production.

Harvesting may occur on lands that are not suitable for timber production. This harvesting is included in this estimate to provide info on possible ecological restoration and management needs within Experimental Forests, harvests to restore prairies or other special areas and habitat improvement within possible old growth.

Regeneration harvests are limited to stands that have reached the culmination of mean annual increment (CMAI). Culmination of mean annual increment of cubic volume does not occur at a precisely predetermined age. It varies by species, site quality and by management practices applied to stands. For natural even-aged stands of loblolly, shortleaf and slash pine the mean annual increment (MAI) peaks at about age 35. For longleaf, however, the peak occurs later at about age 50 (Farrar 1982). Other publications indicate that mean annual increment peaks for loblolly and slash plantations earlier between 20 to 27 years for loblolly and 18 to 25 years for slash (Sullivan and Williston 1977), (Baldwin and Feduccia 1987), (Bennett 1963). Culmination of mean annual increment for hardwoods is later than for pine species. Data on upland oak indicated a peak of mean annual increment at age 70 for managed stands of upland oak (Utz and Sims 1981). A high percentage of National Forests in Mississippi hardwood stands occur in minor stream bottoms, lower slopes or floodplains. These sites are likely to sustain higher levels of growth than those reported by Utz and Sims. The culmination of mean annual increment for hardwood on these sites is likely to be as late as age 90.

Table B 18. Timber sale program quantity in million cubic feet (MMCF) alternative A (custodial) (likely volume outputs for first decade)

Practice	Timber sale program quantity (TSPQ) by district							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)		0.5	1.3	0	0	0	0	1.8
Uneven-aged Management	0	0	0	0	0	0	0	0
Intermediate Harvest								
Commercial Thinning	29.3	11.8	10.6	0	0	20.1	0	71.8
Salvage /Sanitation								
Other Harvest	1.0							1
Total (MMBF)	151.5	61.5	59.5	0	0	100.5	0	373.0
Total (MMCF)	30.3	12.3	11.9	0	0	20.1	0	74.6
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)								
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning								
Salvage /Sanitation								
Other Harvest			0.1					0.1
Total (MMBF)	0	0	0.5	0		0	0	0.5
Total (MMCF)	0	0	0.1	0		0	0	0.1
Grand Total (MMBF)	151.5	61.5	60.0	0	0	100.5	0	373.5
Grand Total (MMCF)	30.3	12.3	12.0	0	0	20.1	0	74.7

Table B 19. Timber sale program quantity in million cubic feet (MMCF) alternative A (custodial) (likely volume outputs for second decade)

Practice	Timber sale program quantity (TSPQ) by district							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)		0.5	1.0	0	0	0	0	1.5
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning	29.1	11.8	11.5	0	0	20.1	0	72.5
Salvage /Sanitation								
Other Harvest	1							1
Total (MMBF)	150.5	61.5	62.5	0	0	100.5	0	375
Total (MMCF)	30.1	12.3	12.5	0	0	20.1	0	75
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)								
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			0.1					0.1
Salvage /Sanitation								
Other Harvest			0.2					0.2
Total (MMBF)	0	0	1.5	0	0	0	0	1.5
Total (MMCF)	0	0	0.3	0	0	0	0	0.3
Grand Total (MMBF)	150.5	61.5	64.0	0	0	100.5	0	376.5
Grand Total (MMCF)	30.1	12.3	12.8	0	0	20.1	0	75.3

Table B 20. Timber sale program quantity in million cubic feet (MMCF) alternative B (no action) (likely volume outputs for first decade)

Practice	Timber sale program quantity (TSPQ) by district							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	0	2.4	8.7	.2	7.0	12.5	2.1	32.9
Uneven-aged Management	0	0	0	0	0	0	0	0
Intermediate Harvest								
Commercial Thinning	17.6	17.2	10.5	2.8	6.1	26.5	4.4	85.1
Salvage /Sanitation								
Other Harvest	1.9							1.9
Total (MMBF)	97.5	98.0	96	15.0	65.5	195	32.5	599.5
Total (MMCF)	19.5	19.6	19.2	3.0	13.1	39.0	6.5	119.9
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			0.1					0.1
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			0.1					0.1
Salvage /Sanitation								
Other Harvest	0.1							0.1
Total (MMBF)	0.5	0	1.0	0	0	0	0	1.5
Total (MMCF)	0.1	0	0.2	0	0	0	0	0.3
Grand Total (MMBF)	98.0	98.0	97	15.0	65.5	195	32.5	601.0
Grand Total (MMCF)	19.6	19.6	19.4	3.0	13.1	39.0	6.5	120.2

Table B 21. Timber sale program quantity in million cubic feet (MMCF) alternative B (no action) (likely volume outputs for second decade)

Practice	Timber sale program quantity (TSPQ) by district							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	.1	3.0	8.9	1.8	7.0	14.0	2.7	37.5
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning	18.5	16.3	10.5	4.2	6.2	25.1	3.9	84.7
Salvage /Sanitation								
Other Harvest	1.0							1.0
Total (MMBF)	98	96.5	97	30.0	66.0	195.5	33.0	616.0
Total (MMCF)	19.6	19.3	19.4	6.0	13.2	39.1	6.6	123.2
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			0.1					0.1
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning		0.4	0.1					0.5
Salvage /Sanitation								
Other Harvest	0.1							0.1
Total (MMBF)	0.5	2.0	1.0	0	0	0	0	3.5
Total (MMCF)	0.1	0.4	0.2	0	0	0	0	0.7
Grand Total (MMBF)	98.5	98.5	98.0	30.0	66.0	195.5	33.0	619.5
Grand Total (MMCF)	19.7	19.7	19.6	6.0	13.2	39.1	6.6	123.9

Table B 22. Timber sale program quantity in million cubic feet (MMCF) alternative C (proposed action) (likely volume outputs for first decade)

Practice	Timber sale program quantity (TSPQ) by district							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)		3.5	12.9	1.6	10.6	19.8	3.6	52.0
Uneven-aged Management	0	0	0	0	0	0	0.1	0.1
Intermediate Harvest								
Commercial Thinning	27.3	20.5	16.2	3.3	9.5	40.2	6.8	123.8
Salvage /Sanitation								
Other Harvest	2.8							2.8
Total (MMBF)	150.5	120.0	145.5	24.5	100.5	300	52.5	893.5
Total (MMCF)	30.1	24.0	29.1	4.9	20.1	60.0	10.5	178.7
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)					0.3			0.3
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			0.1					0.1
Salvage /Sanitation								
Other Harvest	0.2		1.9					2.1
Total (MMBF)	1.0	0	10	0	1.5	0	0	12.5
Total (MMCF)	0.2	0	2.0	0	0.3	0	0	2.5
Grand Total (MMBF)	151.5	120	155.5	24.5	102.0	300	52.5	906.0
Grand Total (MMCF)	30.3	24.0	31.1	4.9	20.4	60	10.5	181.2

Table B 23. Timber sale program quantity in million cubic feet (MMCF) alternative C (proposed action) (likely volume outputs for second decade)

Practice	Timber sale program quantity (TSPQ) by district							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	3.0	4.2	12.1	1.5	10.5	19.8	3.6	54.7
Uneven-aged Management							.1	.1
Intermediate Harvest								
Commercial Thinning	27.2	19.9	16.5	3.5	9.6	40.5	6.8	124.0
Salvage /Sanitation								
Other Harvest								
Total (MMBF)	151.0	120.5	143	25.0	100.5	301.5	52.5	894
Total (MMCF)	30.2	24.1	28.6	5.0	20.1	60.3	10.5	178.8
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			0.2		0.1			0.3
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			0.1		0.1			0.2
Salvage /Sanitation								
Other Harvest			1.9					1.9
Total (MMBF)	0	0	11	0	1.0	0	0	12.0
Total (MMCF)	0	0	2.2	0	0.2	0	0	2.4
Grand Total (MMBF)	151.0	120.5	154.0	25.0	101.5	301.5	52.5	906
Grand Total (MMCF)	30.2	24.1	30.8	5.0	20.3	60.3	10.5	181.2

Table B 24. Timber sale program quantity in million cubic feet (MMCF) alternative D (accelerated restoration) (likely volume outputs for first decade)

Practice	Timber sale program quantity (TSPQ) by district							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)		11.3	19.7	1.6	16.1	34.0	8.3	91.0
Uneven-aged Management	0	0	0	0	0	0	0.1	0.1
Intermediate Harvest								
Commercial Thinning	35.0	12.5	13.6	3.4	7.7	30.0	1.7	103.9
Salvage /Sanitation								
Other Harvest	5.0							5.0
Total (MMBF)	200.0	119.0	166.5	25.0	119.0	320.0	50.5	1000
Total (MMCF)	40.0	23.8	33.3	5.0	23.8	64.0	10.1	200.0
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			0.2		0.2			0.4
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning		0.1	0.2					0.3
Salvage /Sanitation								
Other Harvest	0.2		1.4					1.6
Total (MMBF)	1.0	0.5	9.0	0	1.0	0	0	11.5
Total (MMCF)	.2	0.1	1.8	0	0.2	0	0	2.3
Grand Total (MMBF)	201.0	119.5	175.5	25.0	120.0	320.0	50.5	1011.5
Grand Total (MMCF)	40.2	23.9	35.1	5.0	24.0	64.0	10.1	202.3

Table B 25. Timber sale program quantity in million cubic feet (MMCF) alternative D (accelerated restoration) (likely volume outputs for second decade)

Practice	Timber sale program quantity (TSPQ) by district							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	20.7	8.2	15.5	1.5	15.5	37.5	7.0	105.9
Uneven-aged Management							0.1	0.1
Intermediate Harvest								
Commercial Thinning	19.4	15.5	17.8	3.5	8.3	26.5	5.0	96.0
Salvage /Sanitation								
Other Harvest								
Total (MMBF)	200.5	118.5	166.5	25.0	119.0	320.0	60.5	1010.0
Total (MMCF)	40.1	23.7	33.3	5.0	23.8	64.0	12.1	202.0
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			0.2		0.2			0.4
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning		0.3	0.3					0.6
Salvage /Sanitation								
Other Harvest			1.2					1.2
Total (MMBF)	0	1.5	8.5	0	1.0	0	0	11.0
Total (MMCF)	0	0.3	1.7	0	0.2	0	0	2.2
Grand Total (MMBF)	200.5	120.0	175.0	25.0	120.0	320.0	60.5	1021.0
Grand Total (MMCF)	40.1	24.0	35.0	5.0	24.0	64.0	12.1	204.2

Table B 26. Timber sale program quantity in million cubic feet (MMCF) alternative E (enhanced forest health) (likely volume outputs for first decade)

Practice	Timber sale program quantity (TSPQ) by district							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)		3.5	9.7	1.6	21.8	26.0	5.8	68.4
Uneven-aged Management	0	0	0	0	0	0	0.1	0.1
Intermediate Harvest								
Commercial Thinning	45.1	20.5	34.1	3.4	12.1	38.1	9.1	162.4
Salvage /Sanitation								
Other Harvest	4.8							4.8
Total (MMBF)	249.5	120.0	219.0	25.0	169.5	320.5	75.0	1178.5
Total (MMCF)	49.9	24.0	43.8	5.0	33.9	64.1	15.0	235.7
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			0.2		0.2			0.4
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			0.5					0.5
Salvage /Sanitation								
Other Harvest	0.2		0.1					0.3
Total (MMBF)	1.0	0	4.0	0	1.0	0	0	6
Total (MMCF)	.2	0	.8	0	.2	0	0	1.2
Grand Total (MMBF)	250.5	120.0	223.0	25.0	170.5	320.5	75.0	1184.5
Grand Total (MMCF)	50.1	24.0	44.6	5.0	34.1	64.1	15.0	236.9

Table B 27. Timber sale program quantity in million cubic feet (MMCF) alternative E (enhanced forest health) (likely volume outputs for second decade)

Practice	Timber sale program quantity (TSPQ) by district							
Lands where timber production achieves, or is compatible with desired conditions and objectives								
	Bienville	**Chickasawhay**	**DeSoto**	**Delta**	**Holly Springs**	**Homochitto**	**Tombigbee**	**Total**
Regeneration Cutting (even- or two-aged)	14.7	4.2	9.6	1.5	22.3	21.0	6.1	79.4
Uneven-aged Management							0.1	0.1
Intermediate Harvest								
Commercial Thinning	35.3	19.9	34.1	3.5	11.6	43.1	8.9	156.4
Salvage /Sanitation								
Other Harvest								
Total (MMBF)	250.0	120.5	218.5	25.0	169.5	320.5	75.5	1179.5
Total (MMCF)	50.0	24.1	43.7	5.0	33.9	64.1	15.1	235.9
Lands not suited for timber production								
Regeneration Cutting (even- or two-aged)			0.1		0.2			0.3
Uneven-aged Management								
Intermediate Harvest								
Commercial Thinning			0.5					0.5
Salvage /Sanitation								
Other Harvest			0.1					
Total (MMBF)	0	0	3.5	0	1.0	0	0	4.5
Total (MMCF)	0	0	0.7	0	0.2	0	0	0.9
Grand Total (MMBF)	250.0	120.5	222.0	25.0	170.5	320.5	75.5	1184.0
Grand Total (MMCF)	50.0	24.1	44.4	5.0	34.1	64.1	15.1	236.8

Product Mix

The current mix of timber products as tracked in the Forest Service transaction evidence evaluation database was used to estimate products likely to be produced from the Timber Sale Program Quantity of each alternative. The volumes modeled were cubic foot volumes not broken into products to estimate summaries and totals in the tables above. The transaction evidence evaluation database has historical data that is used in the Forest Service appraisal process for timber sales. The recent sales product mix was applied as percentages to the forest wide volumes above to estimate the products likely to be produced. These product outcomes are displayed by alternative in Table B 28.

Table B 28. Timber sale program quantity (TSPQ) product mix for the National Forests in Mississippi (first decade) in million cubic feet (MMCF)

		Alternative A Custodial	Alternative B No Action	Alternative C Proposed Action	Alternative D Accelerated Restoration	Alternative E Enhanced Forest Health
TSPQ (MMCF)		**75**	**120**	**181**	**202**	**237**
Products	**Product Mix Percentage**					
Pine Sawtimber	46 %	35	55	83	93	109
Pine Pulpwood	40 %	30	48	72	81	95
Hardwood Sawtimber	4 %	3	5	7	8	9
Hardwood Pulpwood	9 %	7	11	16	18	21

B.2.5 Long-term Sustained Yield and Timber Sale Program Quantity

The long-term sustained yield for the National Forests in Mississippi is the same for all alternatives. The long-term sustained yield does not change by alternative because desired future condition, silvicultural acres for management are the same in all alternatives. The alternatives differ mostly in level of program based on resources available and some variation in which harvest methods to utilize in moving toward the desired conditions. The following chart depicts a long-term sustained yield of 307 million cubic feet per decade for lands suitable for timber production. The chart also displays Timber Sale Program Quantities. The proposed action Timber Sale Program Quantity is approximately 181 million cubic feet per decade. The custodial alternative Timber Sale Program Quantity is approximately 75 million cubic feet per decade. The no-action alternative Timber Sale Program Quantity is approximately 120 million cubic feet per decade. The accelerated restoration alternative Timber Sale Program Quantity is approximately 204 million cubic feet per decade. The enhanced forest health alternative Timber Sale Program Quantity is approximately 237 million cubic feet per decade. The Timber Sale Program Quantity of each alternative analyzed for the National Forests in Mississippi are projected to be almost level and less than the long-term sustained yield (LTSY) for the 5 decades modeled. The Timber Sale Program Quantities are level in the alternative projections because the program level is constrained to an assumed level budget and program implementation capability for each alternative.

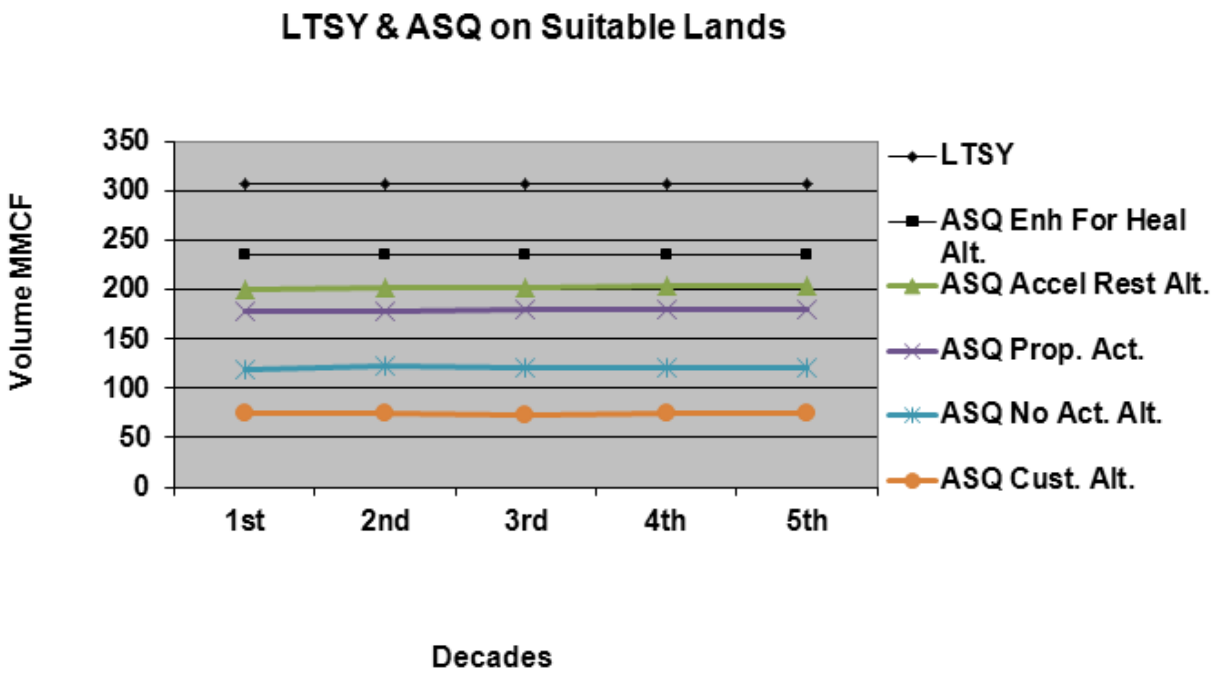

Figure B 1. Long term sustained yield (LTSY) and allowable sale quantity (ASQ) on suitable lands

The USDA Forest Service Southern Research Station Forest Inventory and Analysis 2006 report on Mississippi's forests indicates that the National Forest System Lands in Mississippi have an average net annual growth of 71.4 million cubic feet (Oswalt et al. 2009). This same report estimated average annual removals at 42.2 million cubic feet. Therefore the gross growth per decade for National Forest System Lands in Mississippi based on Southern Research Station Forest Inventory and Analysis has been 1,136 million cubic feet.

B.2.6 Description of Anticipated Changes and Treatments by Vegetation Type

The changes in forest conditions through time and acres of harvest treatments were modeled utilizing a spreadsheet to develop information for the alternatives as described in section Appendix B - . This section provides a summary of the outcomes for the first and second decade from that modeling effort. These outcomes are referred to as proposed and probable respectively by decade. Changes in vegetation classification, harvest treatments and age conditions are displayed for each vegetation classification.

Upland Longleaf Pine Forest

First thinning, subsequent thinning, and woodland thinning were identified as important management activities to promote and maintain the desired ecosystem structural conditions in longleaf system. In threatened and endangered species habitat areas, thinning treatments are the highest priority vegetation treatments because they help create optimal habitat conditions for species recovery. Table B 29 projects the proposed level of acres of these activities during the first decade and the probable acres during the second decade for each of the alternatives.

Table B 29. Longleaf forest timber treatments by alternative

	First Thinning		Subsequent Thinning		Woodland Thinning		Totals	
Alternative	**Proposed 1st Decade**	**Probable 2nd Decade**	**Proposed 1st Decade**	**Probable 2nd Decade**	**Proposed 1st Decade**	**Probable 2nd Decade**	**Proposed 1st Decade**	**Probable 2nd Decade**
Alternative A Custodial	3,783	7,391	10,266	15,584	4,877	1,794	18,926	24,769
Alternative B No Action	3,038	6,287	20,718	19,564	0	0	23,756	25,851
Alternative C Proposed Action	4,202	6,965	25,100	30,573	4,418	1,563	33,720	39,101
Alternative D Accelerated Restoration	5,183	11,864	12,759	28,668	7,467	2,851	25,409	43,383
Alternative E Enhanced Forest Health	7,838	12,669	26,747	35,773	9,161	4,674	43,746	53,116

Restoration of the longleaf pine forest ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system. The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus) are important for evaluating ecological viability of each system. Table B 30 projects the proposed level of longleaf pine forest and woodland in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. The acres in regeneration are all the result of conversion from loblolly and slash pine.

Table B 30. Longleaf pine forest age structure after 1st and 2nd decades

	Acres of Longleaf Pine		Acres in Regeneration		Acres of Mature Forest	
Alternative	**Proposed 1st Decade**	**Probable 2nd Decade**	**Proposed 1st Decade**	**Probable 2nd Decade**	**Proposed 1st Decade**	**Probable 2nd Decade**
Alternative A Custodial	238,876	239,802	847 (0.4%)	927 (0.4%)	152,776 (64%)	160,572 (67%)
Alternative B No Action	246,660	256,777	8,632 (3.5%)	10,118 (3.9%)	152,775 (62%)	160,571 (63%)
Alternative C Proposed Action	251,152	267,111	13,125 (5.2%)	15,959 (6.0%)	152,775 (61%)	160,571 (60%)
Alternative D Accelerated Restoration	261,285	287,942	23,256 (8.9%)	26,658 (9.3%)	152,775 (58%)	160,571 (56%)
Alternative E Enhanced Forest Health	251,705	268,389	13,678 (5.4%)	16,682 (6.2%)	152,775 (61%)	160,571 (60%)

Shortleaf Pine Forest

First thinning, subsequent thinning, even-aged and uneven aged regeneration were identified as important management activities to promote and maintain the desired ecosystem structural conditions for the shortleaf system. Table B 31 projects the proposed level of acres of these activities during the first decade and the probable acres during the second decade for each of the alternatives.

Table B 31. Shortleaf pine forest timber harvest treatments

	First Thin		Subsequent Thinning		Woodland Thinning		Even-aged Regen.		Uneven-aged Management		Totals	
	Decade											
Alternative	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**
Alternative A Custodial	50	18	1,016	739	0	0	0	0	0	0	1,066	757
Alternative B No Action	413	189	2,515	2,044	0	0	638	730	0	0	3,566	2,963
Alternative C Proposed Action	647	330	3,425	2,787	64	36	1,409	1,403	16	14	5,561	4,570
Alternative D Accelerated Restoration	492	553	2,381	2,159	355	455	343	342	16	17	3,587	3,526
Alternative E Enhanced Forest Health	558	513	5,860	4,705	0	382	2,773	3,401	16	17	9,207	9,018

Restoration of the shortleaf pine forest ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system. The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus years) are important for evaluating ecological viability of each system. Table B 32 projects the proposed level of shortleaf pine forest and woodland in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. Regeneration acres represent acres converted from loblolly pine as well as even-aged regeneration of shortleaf pine. There are a minor amount of slash pine acres on the Holly Springs and Tombigbee districts. Slash pine was not modeled separately for these units. Slash pine conversion to shortleaf is included in the upland loblolly acres and should be given priority to convert. The values represent a decadal total.

Table B 32. Shortleaf pine forest age structure after 1st and 2nd decades

	Total Acres of Shortleaf Pine-Oak		Acres in Regeneration		Acres of Mature Forest	
Alternative	**Proposed 1st Decade**	**Probable 2nd Decade**	**Proposed 1st Decade**	**Probable 2nd Decade**	**Proposed 1st Decade**	**Probable 2nd Decade**
Alternative A Custodial	59,139	59,139	0	0	48,960 (83%)	50,036 (85%)
Alternative B No Action	60,819	62,915	2,346 (3.9%)	2,826 (4.5%)	50,368 (83%)	48,640 (77%)
Alternative C Proposed Action	61,815	64,497	4,033 (6.5%)	4,085 (6.3%)	41,121 (67%)	47,196 (73%)
Alternative D Accelerated Restoration	68,049	75,438	9,281 (13.6%)	7,669 (10.2%)	48,589 (71%)	49,322 (65%)
Alternative E Enhanced Forest Health	66,616	73,267	10,279 (15.4%)	10,075 (13.8%)	46,159 (69%)	43,831 (60%)

Upland Loblolly Pine Forest

Overabundance of the upland loblolly pine forest ecological system on the landscape is the most important characteristic of this system. Conversion of most of the loblolly pine forest ecological system to appropriate ecological systems is a high priority for long-term sustainability of the forest. Table B 33 projects the proposed level of acres converted by regeneration to appropriate ecological systems during the first decade and the probable acres during the second decade for each of the alternatives. The values represent a decadal total.

Table B 33.Upland loblolly pine forest conversion

	Acres Converted	
Alternative	**1st Decade**	**2nd Decade**
Alternative A Custodial	431	478
Alternative B No Action	8,728	10,507
Alternative C Proposed Action	14,246	15,753
Alternative D Accelerated Restoration	29,928	31,745
Alternative E Enhanced Forest Health	22,890	22,847

First thinning, subsequent thinning, even-aged and uneven-aged regeneration were identified as important management activities to promote and maintain the desired ecosystem structural conditions of upland loblolly pine. Table B 34 projects the proposed level of acres of these activities during the first decade and the probable acres during the second decade for each of the alternatives. The even aged regeneration acres include acres harvested to convert to appropriate tree species, but not prairie restoration on the Bienville.

Table B 34. Upland loblolly pine forest timber harvest treatments

	First Thinning		Subsequent Thinning		Even-aged Regeneration		Uneven-aged Management		Totals	
	Decade									
Alternative	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Alt. A Cust.	12,884	7,573	14,938	20,665	143	190	0	0	27,965	28,428
Alt. B No Act.	17,083	14,052	18,520	18,339	9,315	10,787	0	0	44,918	43,178
Alt. C Proposed	25,827	22,580	27,471	34,128	13,963	16,313	38	36	67,299	73,057
Alt. D Accel. Rest.	21,990	10,838	23,538	30,850	29,139	32,245	40	0	74,707	73,933
Alt. E Enh. F.H.	25,587	22,594	37,913	46,666	22,101	22,947	40	7	85,641	92,214

The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus) are important for evaluating ecological viability of each system. Table B 35 projects the proposed level of upland loblolly pine forest in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. Regeneration acres represent acres harvested but not converted from loblolly pine to shortleaf or longleaf pine. The values represent a decadal total.

Table B 35. Upland loblolly pine forest age structure after 1st and 2nd decade

	Total Acres of Upland Loblolly Pine Forest		Acres in Regeneration		Acres of Mature Forest	
Alternative	1st Decade	2nd Decade	1st Decade	2nd Decade	1st Decade	2nd Decade
Alternative A Custodial	299,317	298,807	0	0	135,502 (45%)	152,609 (51%)
Alternative B No Action	291,042	280,534	1094 (0.4%)	508 (0.2%)	126,016 (43%)	133,104 (47%)
Alternative C Proposed Action	286,524	269,770	506 (<0.2%)	557 (0.2%)	121,965 (43%)	122,818 (46%)
Alternative D Accelerated Restoration	277,087	251,139	313 (0.1%)	339 (0.1%)	114,162 (41%)	104,860 (42%)
Alternative E Enhanced Forest Health	276,880	253,906	0	5 (0.002%)	120,446 (44%)	113,982 (45%)

Mesic Loblolly Pine Forest

Overabundance of the mesic loblolly pine forest ecological system on the landscape is the most important characteristic of this system. Conversion of most of the mesic loblolly pine forest ecological system to appropriate ecological systems is a high priority for long-term sustainability of the forest. An exception to

this conversion emphasis would be to retain mesic loblolly in red cockaded-woodpecker habitat management areas rather than convert to hardwood dominated overstory conditions not suitable for the woodpecker. Table B 36 projects the proposed level of acres converted by regeneration to appropriate ecological systems during the first decade and the probable acres during the second decade for each of the alternatives. The values represent a decadal total.

Table B 36. Mesic loblolly pine forest conversion

	Acres Converted	
Alternative	**1st Decade**	**2nd Decade**
Alternative A Custodial	60	57
Alternative B No Action	696	624
Alternative C Proposed Action	1,183	1,304
Alternative D Accelerated Restoration	2,424	2,856
Alternative E Enhanced Forest Health	1,983	2,053

First thinning, subsequent thinning, even-aged and uneven-aged regeneration were identified as important management activities to promote and maintain the desired ecosystem structural conditions. Table B 37 projects the proposed level of acres of these activities during the first decade and the probable acres during the second decade for each of the alternatives. The even aged regeneration acres include acres harvested to convert to appropriate tree species.

Table B 37. Mesic loblolly pine forest timber harvest treatments

	First Thinning		Subsequent Thinning		Even-aged Regeneration		Uneven-aged Management		Totals	
	Decade									
Alternative	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**
Alt. A Cust.	7,289	4,398	10,624	12,167	60	57	0	0	17,973	16,622
Alt. B No Act.	6,811	6,557	9,278	9,167	696	624	0	0	16,785	16,348
Alt. C Proposed	10,512	10,618	14,144	13,732	618	2,075	14	13	25,288	26,438
Alt. D Accel. Rest.	8,546	2,916	14,117	10,458	3,172	2,856	8	10	25,843	16,240
Alt. E Enh. F.H.	11,019	5,358	18,891	17,506	1,983	2,054	8	10	31,901	24,928

The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus) are important for evaluating ecological viability of each system. Table B 38 projects the proposed level of mesic loblolly pine forest in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. Regeneration acres represent acres harvested but not converted from loblolly pine to mesic slope hardwood forest or longleaf pine. The values represent a decadal total.

Table B 38. Mesic loblolly pine forest age structure after 1st and 2nd decade

	Total Acres of Mesic Loblolly Pine Forest		Acres in Regeneration		Acres of Mature Forest	
Alternative	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**
Alternative A Custodial	143,109	143,043	0	0	90,909 (64%)	97,778 (68%)
Alternative B No Action	143,468	142,857	0	0	90,280 (63%)	96,592 (68%)
Alternative C Proposed Action	142,982	141,679	29 (0.02%)	7 (0.004%)	84,021 (59%)	89,817 (63%)
Alternative D Accelerated Restoration	140,993	138,137	0	0	87,804 (62%)	91,883 (67%)
Alternative E Enhanced Forest Health	142,183	140,130	0	1 (0.0007%)	88,995 (63%)	93,878 (67%)

Slash Pine Forest

Overabundance of the slash pine forest ecological system on the landscape is the most important characteristic of this system. Conversion of most of the slash pine forest ecological system to appropriate ecological systems is the highest priority for long-term sustainability of the forest. Table B 39 projects the proposed level of acres converted by regeneration to appropriate ecological systems during the first decade and the probable acres during the second decade for each of the alternatives. The values represent a decadal total.

Table B 39. Slash pine forest conversion

	Acres Converted	
Alternative	**1st Decade**	**2nd Decade**
Alternative A Custodial	571	603
Alternative B No Action	4,099	4,179
Alternative C Proposed Action	5,307	6,059
Alternative D Accelerated Restoration	9,219	7,804
Alternative E Enhanced Forest Health	4,296	5,085

First thinning and subsequent thinning were identified as important management activities to promote and maintain the desired ecosystem structural conditions. Table B 40 projects the proposed level of acres of these activities during the first decade and the probable acres during the second decade for each of the alternatives. The even aged regeneration acres include acres harvested to convert to appropriate tree species.

Table B 40. Slash pine forest timber harvest treatments

	First Thinning		Subsequent Thinning		Even-aged Regeneration		Totals	
Alternative	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**
Alternative A Custodial	7,289	4,398	10,624	12,167	60	57	0	0
Alternative B No Action	6,811	6,557	9,278	9,167	696	624	0	0
Alternative C Proposed Action	10,512	10,618	14,144	13,732	618	2,075	14	13
Alternative D Accelerated Restoration	8,546	2,916	14,117	10,458	3,172	2,856	8	10
Alternative E Enhanced Forest Health	11,019	5,358	18,891	17,506	1,983	2,054	8	10

The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus) are important for evaluating ecological viability of each system. Table B 41 projects the proposed level of slash pine forest in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. Regeneration acres represent acres harvested but not converted from slash pine to mesic slope hardwood forest or longleaf pine. The values represent a decadal total.

Table B 41. Slash pine forest age structure after 1st and 2nd decade

	Total Acres of Slash Pine Forest		Acres in Regeneration		Acres of Mature Forest	
Alternative	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**
Alternative A Custodial	114,231	113,592	0	0	41,972 (37%)	55,621 (49%)
Alternative B No Action	110,745	106,566	0	0	40,061 (36%)	49,883 (47%)
Alternative C Proposed Action	109,537	103,479	0	0	39,052 (34%)	48,108 (46%)
Alternative D Accelerated Restoration	105,625	97,820	0	0	36,006 (34%)	42,875 (44%)
Alternative E Enhanced Forest Health	110,547	105,463	0	0	39,358 (36%)	48,948 (46%)

Northern Dry Upland Hardwood Forest

First thinning, subsequent thinning and gap creation, and irregular even-aged regeneration were identified as important management activities to promote and maintain the desired ecosystem structural conditions.

Table B 42 projects the proposed level of acres of these activities during the first decade and the probable acres during the second decade for each of the alternatives.

Table B 42. Northern dry upland hardwood forest timber harvest treatments

	First Thinning		Subsequent Thinning		Woodland Thinning		Irregular Even-aged Regeneration		Uneven-aged Management		Totals	
	Decade											
Alt.	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Alt. A Cust.	0	0	0	0	0	0	0	0	0	0	0	0
Alt. B No Act.	277	108	874	1,649	0	0	967	429	0	0	2,118	2,186
Alt. C Proposed	435	128	1,236	2,006	24	64	1,538	1,354	11	11	3,244	3,563
Alt. D Accel. Rest.	272	100	820	1,677	182	55	75	647	18	22	1,367	2,501
Alt. E Enh. F.H.	244	90	8,339	5,643	0	461	2,138	2,510	18	22	10,739	8,726

Restoration to appropriate sites is the highest priority for long-term sustainability of this ecological system. The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus) are important for evaluating ecological viability of each system. Table B 43 projects the proposed level of northern dry upland hardwood forest and woodland in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. Regeneration acres represent acres converted from loblolly pine as well as even-aged regeneration of northern dry upland hardwood. The values represent a decadal total.

Table B 43. Northern dry upland hardwood forest age structure after 1st and 2nd decades

	Total Acres of Northern Dry Upland Hardwood		Acres in Regeneration		Acres of Mature Forest	
Alternative	1st Decade	2nd Decade	1st Decade	2nd Decade	1st Decade	2nd Decade
Alternative A Custodial	52,376	52,376	0	0	49,098 (94%)	49,730 (95%)
Alternative B No Action	54,084	56,180	2011 (3.7%)	1,687 (3.0%)	48,132 (89%)	48,335 (86%)
Alternative C Proposed Action	56,021	57,670	3,186 (5.7%)	3,010 (5.2%)	47,562 (85%)	46,840 (81%)
Alternative D Accelerated Restoration	58,816	62,478	4,520 (7.7%)	4,310 (6.9%)	49,023 (83%)	49,008 (78%)
Alternative E Enhanced Forest Health	57,762	60,947	5,528 (9.6%)	5,696 (9.3%)	46,960 (81%)	45,082 (74%)

Southern Dry Upland Hardwood and Southern Loess Bluff Forest

Restoration of the southern dry upland hardwood forest and southern loess bluff forest ecological system to appropriate sites is important for long-term sustainability of this ecological system. No management activities were identified as a priority for the first decade to promote and maintain the desired ecosystem structural conditions; rather this system will use natural processes to reach the desired condition. Some restoration of upland loblolly to southern loess bluff forest was modeled on the Homochitto.

The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus) are important for evaluating ecological viability of each system. Table B 44 projects the proposed level of northern dry upland hardwood forest and woodland in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. The values represent a decadal total.

Table B 44. Southern dry upland hardwood forest age structure after 1st and 2nd decades

	Total Acres of Southern Dry Upland Hardwood		Acres in Regeneration		Acres of Mature Forest	
Alternative	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**
Alternative A Custodial	52,030	52,724	517 (1.0%)	694 (1.3%)	46,405 (89%)	48,008 (91%)
Alternative B No Action	51,768	52,118	284 (0.5%)	350 (0.7%)	46,382 (90%)	47,987 (92%)
Alternative C Proposed Action	51,997	52,691	517 (1.0%)	694 (1.3%)	46,379 (89%)	47,984 (91%)
Alternative D Accelerated Restoration	52,570	53,994	1,086 (2.1%)	1,424 (2.6%)	46,382 (88%)	47,986 (89%)
Alternative E Enhanced Forest Health	52,425	53,244	941 (1.8%)	819 (1.5%)	46,382 (88%)	47,986 (90%)

Southern Mesic Slope Forest

Restoration of the southern mesic slope hardwoods ecological system to appropriate sites is important for long-term sustainability of this ecological system. No management activities were identified as a priority for the first decade to promote and maintain the desired ecosystem structural conditions; rather this system will use natural processes to reach the desired condition. Some restoration of loblolly and slash pine to southern mesic slope hardwoods was modeled on the DeSoto and Homochitto.

The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus) are important for evaluating ecological viability of each system. Table B 45 projects the proposed level of southern mesic slope hardwoods in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. The values represent a decadal total.

Table B 45. Southern mesic slope hardwood forest age structure after 1st and 2nd decades

	Total Acres of Southern Mesic Slope Hardwood		Acres in Regeneration		Acres of Mature Forest	
Alternative	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**
Alternative A Custodial	15,833	15,833	0	0	14,601 (92%)	14,872 (94%)
Alternative B No Action	16,465	17,009	632 (3.8%)	544 (3.2%)	14,601 (89%)	14,872 (87%)
Alternative C Proposed Action	16,551	17,361	718 (4.3%)	809 (4.7%)	14,601 (88%)	14,872 (86%)
Alternative D Accelerated Restoration	17,496	18,889	1,663 (9.5%)	1,393 (7.4%)	14,601 (83%)	14,872 (79%)
Alternative E Enhanced Forest Health	16,822	17,825	989 (5.9%)	1003 (5.6%)	14,601 (87%)	14,872 (83%)

Northern Mesic Hardwood Forest

Restoration to appropriate sites is the highest priority for long-term sustainability of this ecological system.

First thinning, subsequent thinning and gap creation, irregular even-aged regeneration and uneven-aged regeneration were identified as important management activities to promote and maintain the desired ecosystem structural conditions. Table B 46 projects the proposed level of northern mesic slope hardwoods in regeneration and mature structural condition at the end of the first decade and the probable acres at the end of the second decade for each of the alternatives.

Table B 46. Northern mesic hardwood forest timber harvest treatments

	First Thinning		Subsequent Thinning		Irregular Even-aged Regeneration		Uneven-aged Management		Totals	
	Decade									
Alt.	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**
Alt. A Cust.	0	0	0	0	0	0	0	0	0	0
Alt. B No Act.	12	0	100	103	39	27	0	0	151	130
Alt. C Proposed	19	0	108	207	63	104	1	2	191	313
Alt. D Accel. Rest.	12	2	27	99	62	17	0	0	101	118
Alt. E Enh. F.H.	11	52	178	239	0	80	2	3	191	321

The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus) are important for evaluating ecological viability of each system. Table B 47 projects the proposed level of to northern mesic slope hardwoods in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. The values represent a decadal total by management unit and regeneration acres represent acres converted from loblolly pine and irregular even-aged regeneration of hardwoods.

Table B 47. Northern mesic hardwood forest age structure after 1st and 2nd decades

	Total Acres of Northern Mesic Hardwood		Acres in Regeneration		Acres of Mature Forest	
Alternative	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**
Alternative A Custodial	3,568	3,568	0	0	3,051	3,176
Alternative B No Action	3,782	4,003	253 (6.7%)	248 (6.2%)	3,110 (82%)	3,110 (78%)
Alternative C Proposed Action	3,879	4,160	373 (9.6%)	385 (9.3%)	2,988 (77%)	3,009 (72%)
Alternative D Accelerated Restoration	4,248	4,838	742 (17.5%)	608 (12.6%)	2,989 (70%)	3,081 (63.7%)
Alternative E Enhanced Forest Health	3,981	4,417	413 (10.4%)	512 (11.6%)	3,051 (77%)	3,099 (70%)

Floodplain Forest

Restoration to appropriate sites is the highest priority for long-term sustainability of this ecological system. Restoration to this ecological system will be conversion from loblolly slash, and shortleaf pine forest. Both managed and natural thinning of pines will favor floodplain hardwoods over time as well.

First thinning, subsequent thinning and gap creation, irregular even-aged and uneven-aged regeneration were identified as important management activities to promote and maintain the desired ecosystem structural conditions on the Holly Springs and Tombigbee Districts. No management activities were identified as a priority for the other districts on the Forest to promote and maintain the desired ecosystem structural conditions; rather natural processes will allow floodplain forests on these units to reach the desired condition. Table B 48 projects the proposed level of to floodplain hardwoods in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives.

Table B 48. Floodplain hardwood forest timber harvest treatments

	First Thinning		Subsequent Thinning		Irregular Even-aged Regeneration		Uneven-aged Management		Totals	
	Decade									
Alt.	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Alt. A Cust.	0	0	0	0	0	0	0	0	0	0
Alt. B No Act.	110	25	267	343	243	114	0	0	620	482
Alt. C Proposed	228	30	363	438	383	535	2	5	976	1,008
Alt. D Accel. Rest.	228	97	284	406	134	153	0	0	646	656
Alt. E Enh. F.H.	0	94	1,076	1,286	124	480	4	6	1,204	1,866

The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus) are important for evaluating ecological viability of each system. Table B 49 projects the proposed level of to floodplain forest in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. Regeneration acres represent acres converted from loblolly and shortleaf pine, and irregular even-aged regeneration of hardwoods. The values represent a decadal total.

Table B 49. Floodplain hardwood forest age structure after 1st and 2nd decades

	Total Acres of Floodplain Hardwood		Acres in Regeneration		Acres of Mature Forest	
Alternative	1st Decade	2nd Decade	1st Decade	2nd Decade	1st Decade	2nd Decade
Alternative A Custodial	96,424	96,424	0	0	88,435 (92%)	89,925 (93%)
Alternative B No Action	96,924	97,366	744 (0.8%)	656 (0.7%)	88,192 (91%)	89,568 (92%)
Alternative C Proposed Action	97,346	98,379	1,305 (1.3%)	1,569 (1.6%)	88,053 (90%)	89,007 (90%)
Alternative D Accelerated Restoration	96,905	97,399	864 (0.9%)	1,029 (1.1%)	88,053 (91%)	89,007 (91%)
Alternative E Enhanced Forest Health	97,885	99,175	1,585 (1.6%)	1,770 (1.8%)	88,312 (90%)	89,321 (90%)

Lower Mississippi River Bottomland and Floodplain Forest

Maintenance and improvement of species composition of the lower Mississippi River bottomland and floodplain forest ecological system on appropriate sites is the highest priority for long-term sustainability of this ecological system.

Thinning and gap creation and irregular even-aged regeneration were identified as important management activities to promote and maintain the desired ecosystem structural conditions during the first decade. Table B 50 projects the proposed level of to lower Mississippi River Bottomland and floodplain forest in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives.

Table B 50. Lower Mississippi River bottomland and floodplain forest timber harvest treatments

	First Thinning		Subsequent Thinning		Irregular Even-aged Regeneration		Totals	
Alternative	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**
Alternative A Custodial	0	0	0	0	0	0	0	0
Alternative B No Action	0	0	5,079	4,576	177	951	5,256	5,227
Alternative C Proposed Action	0	0	6,496	7,535	1,357	1,212	7,853	8,747
Alternative D Accelerated Restoration	0	0	6,496	7,535	1,357	1,212	7,853	8,747
Alternative E Enhanced Forest Health	0	0	6,496	7,535	1,357	1,212	7,853	8,747

The acres of forest in regeneration (0-10 years) and mature condition (age 60 plus) are important for evaluating ecological viability of each system. Table B 51 projects the proposed level of to lower Mississippi River bottomland and floodplain forest in regeneration and mature structural condition at end of the first decade and the probable acres at end of the second decade for each of the alternatives. The values represent decadal totals.

Table B 51. Lower Mississippi River bottomland and floodplain forest age structure after 1st and 2nd decades

	Total Acres of Lower Mississippi River Bottomland and Floodplain Forest		Acres in Regeneration		Acres of Mature Forest	
Alternative	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**
Alternative A Custodial	59,197	59,197	0	0	42,906 (72%)	45,708 (77%)
Alternative B No Action	59,197	59,197	177 (.3%)	951 (1.6%)	42,729 (72%)	44,579 (75%)
Alternative C Proposed Action	59,197	59,197	1,357 (2.3%)	1,212 (2.0%)	41,549 (70%)	43,139 (73%)
Alternative D Accelerated Restoration	59,197	59,197	1,357 (2.3%)	1,212 (2.0%)	41,549 (70%)	43,139 (73%)
Alternative E Enhanced Forest Health	59,197	59,197	1,357 (2.3%)	1,212 (2.0%)	41,549 (70%)	43,139 (73%)

Near-Coast Pine Flatwoods

Canopy structure is the most important characteristic to species diversity and long-term sustainability of this ecological system. Open conditions with widely scattered longleaf and slash pine trees are critical to the long-term sustainability of this system providing ideal conditions for rare species to flourish. Woodland thins and conversion harvests were identified as important management activities to promote and maintain the desired ecosystem structural conditions. Table B 52 projects the proposed level of near-coast pine flatwoods treated at end of the first decade and the probable acres at end of the second decade for each of the alternatives. Many of the acres of this system cannot be treated commercially due to the wet environment; however, non-commercial treatments can be applied as opportunities arise and natural processes will also contribute to achieving desired conditions.

Table B 52. Near-coast pine flatwoods forest timber harvest treatments alternative A (custodial)

	Woodland Thinning		Conversion Harvest		Totals	
Alternative	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**
Alternative A Custodial	125	319	73	116	198	435
Alternative B No Action	0	0	0	0	0	0
Alternative C Proposed Action	226	207	1,109	999	1,335	1,206
Alternative D Accelerated Restoration	1,186	1,254	794	675	1980	1,929
Alternative E Enhanced Forest Health	516	756	99	90	615	846

Xeric Sandhills

Restoration objectives for xeric sandhills are included in conversion of loblolly and slash pine forest to the upland longleaf pine forest and woodland on the Chickasawhay and De Soto Ranger Districts. Xeric sandhills should be given priority when applying treatments within longleaf pine systems. There are approximately 21,750 acres of xeric sandhills on the De Soto and approximately 2,150 acres on the Chickasawhay. The acres of treatment and conditions are included in the longleaf pine forest section above.

Black Belt Calcareous Prairie and Woodland

This rare ecological system represents open grassy areas dominated by characteristic prairie species. Within this grassland matrix, woody vegetation occurs sparingly in stream bottoms and hilltops with caps of acid soil. It occurs on the Trace Unit of the Tombigbee Ranger District. Maintenance of this system may require tree removal, but no harvests are likely. Noncommercial treatment to remove woody vegetation is expected on 315 acres.

Jackson Prairie and Woodland

This rare ecological system represents open grassy areas dominated by characteristic prairie species. Jackson prairie occurs as calcareous islands (<1-160 acres) on gently sloping uplands surrounded by pine and hardwood forest on generally acid soils. It occurs on the Bienville Ranger District. Maintenance of this system is likely to require tree removal. Noncommercial woody vegetation removal is expected on

381 acres. Table B 53 displays proposed harvests in the first decade converting forested prairie soils to open Jackson prairie and the probable acres in the second decade for each of the alternatives.

Table B 53. Conversion to Jackson prairie and woodland

	Upland Loblolly		Shortleaf Pine		Upland Hardwood		Totals	
Alternative	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**	**1st Decade**	**2nd Decade**
Alternative A Custodial	288	288	0	0	0	0	288	288
Alternative B No Action	507	280	28	0	29	0	564	280
Alternative C Prop. Action	789	345	28	0	33	0	849	345
Alternative D Accel. Rest.	789	345	28	0	29	0	846	345
Alternative E Enh. For. H.	789	345	28	0	29	0	846	345

B.2.7 Anticipated Age Class Changes for Each Alternative Tabulated by Vegetation Type

One of the results of the restoration and regeneration harvests implemented under each alternative would be changes in the age class distribution across the Forests.

This section includes Table B 54 through Table B 58 displaying age class information from each alternative modeled. The tables display acres within three age groups at the end of the first and fifth decades. The three groups used are 0-10 years, 11-59 years and 60 years and above. These groupings are used because acres in 0-10, and 60 plus age classes were important components of the ecological evaluations done on each alternative developed for plan revision. Also, the acres that each alternative creates each decade and the acres reaching mature condition provide the information needed to evaluate the flow of forest products over time as well as provide information to evaluate forest health.

Across all vegetation types the overall forest age shifts to older age classes for all alternatives.

Within individual vegetation types, there are only two alternatives where 60 plus age class acreage was less Forest wide after the fifth decade than it was after the first decade. These occurred in the model outcomes for shortleaf pine-oak forest and woodland in the proposed action alternative (C) and the enhanced forest health alternative (E). This also occurred for dry upland hardwood forest in the enhanced forest health alternative (E).

At the district level, there were three districts and three alternatives where age classes over 60 years contained less acreage than was over 60 after the first decade. Additional summary data by district are included in the Timber Resource Program, Suitability, and Sustainability Analysis planning process record.

The regeneration harvest acres for the overall forest at the end of decade 5 would result in 0 to 10 age class acres of approximately 1 percent for the custodial alternative (A), 2 percent for the no-action alternative (B), 3 percent for the proposed action alternative (C) and the accelerated restoration alternative

(D), and 5 percent for the enhanced forest health alternative (E). This results in effective rotation ages of 1000 years, 500 years, 333 years, 333 years and 200 years respectively.

Table B 54. National Forests in Mississippi custodial alternative A - age class outcome

Age Class System	End of Decade 1			End of Decade 5		
	0-10	11-59	60 +	0-10	11-59	60 +
Upland Loblolly Pine Forest	0	163,815	135,502	0	17,530	274,983
Mesic Loblolly Pine-Hardwood Forest	0	53,188	90,909	0	4,660	138,923
Shortleaf Pine-Oak Forest and Woodland	0	10,178	48,960	0	4,566	54,573
Upland Longleaf Pine Forest	847	85,253	152,776	6,019	25,537	218,271
Slash	0	72,259	41,972	0	1,489	108,818
Flatwoods	0	6,673	10,113	0	368	15,749
Dry Upland Hardwood Forest	0	10,382	95,503	0	655	105,230
Mesic Slope Forest	0	1,750	17,652	0	197	19,204
Floodplain Forest	0	24,278	131,341	0	1,308	154,313
National Forests in Mississippi Totals	847	427,776	724,728	6,019	56,310	1,090,064

Table B 55. National Forests in Mississippi no-action alternative B - age class outcome

Age Class System	End of Decade 1			End of Decade 5		
	0-10	11-59	60 +	0-10	11-59	60 +
Upland Loblolly Pine Forest	1,094	163,511	126,436	119	20,308	217,305
Mesic Loblolly Pine-Hardwood Forest	0	53,188	90,280	5	4,677	135,399
Shortleaf Pine-Oak Forest and Woodland	2,346	10,178	48,294	4,070	16,456	49,457
Upland Longleaf Pine Forest	8,632	85,252	152,775	15,554	62,945	218,270
Slash	0	70,054	40,691	0	1,489	92,968
Flatwoods	0	6,704	10,155	0	377	16,482
Dry Upland Hardwood Forest	2,295	10,375	94,514	2,754	10,010	102,484
Mesic Slope Forest	885	1,750	17,613	1,004	3,374	18,960
Floodplain Forest	921	24,278	130,921	1,688	6,405	150,303
National Forests in Mississippi Totals	16,173	425,290	711,679	25,194	126,041	1,001,628

Table B 56. Proposed action alternative C - age class outcome

Age Class System	End of Decade 1			End of Decade 5		
	0-10	11-59	60 +	0-10	11-59	60 +
Upland Loblolly Pine Forest	506	163,053	121,965	626	19,784	200,880
Mesic Loblolly Pine-Hardwood Forest	29	53,188	89,765	2,336	7,067	125,707
Shortleaf Pine-Oak Forest and Woodland	4,114	10,178	47,523	4,254	21,165	46,731
Upland Longleaf Pine Forest	13,125	85,252	152,775	17,397	84,221	216,547
Slash	0	70,485	39,052	703	1,489	81,767
Flatwoods	0	6,262	9,487	0	278	12,032
Dry Upland Hardwood Forest	3,703	10,375	93,941	4,287	16,371	96,918
Mesic Slope Forest	1,091	1,750	17,589	1,146	5,071	18,817
Floodplain Forest	2,662	24,278	129,602	5,176	12,377	145,162
National Forests in Mississippi Totals	25,230	424,821	701,699	35,925	167,823	944,561

Table B 57. Accelerated restoration alternative D - age class outcome

Age Class System	End of Decade 1			End of Decade 5		
	0-10	11-59	60 +	0-10	11-59	60 +
Upland Loblolly Pine Forest	0	156,759	113,083	0	16,539	147,540
Mesic Loblolly Pine-Hardwood Forest	0	53,188	87,804	0	4,660	126,222
Shortleaf Pine-Oak Forest and Woodland	9,281	10,178	48,589	4,564	33,309	52,892
Upland Longleaf Pine Forest	23,256	85,252	152,775	19,360	114,067	218,270
Slash	0	69,619	36,006	613	1,489	78,770
Flatwoods	0	6,385	9,679	0	322	14,289
Dry Upland Hardwood Forest	5,606	10,375	95,405	4,823	22,665	100,149
Mesic Slope Forest	2,405	1,750	17,590	1,515	8,128	18,838
Floodplain Forest	3,153	24,278	129,850	3,349	12,212	146,028
National Forests in Mississippi Totals	43,701	417,784	690,781	34,224	213,391	902,998

Table B 58. Enhanced forest health alternative E - age class outcome

Age Class System	End of Decade 1			End of Decade 5		
	0-10	11-59	60 +	0-10	11-59	60 +
Upland Loblolly Pine Forest	0	157,672	119,209	0	16,766	172,278
Mesic Loblolly Pine-Hardwood Forest	0	53,188	88,995	5,032	4,661	122,921
Shortleaf Pine-Oak Forest and Woodland	10,279	10,178	46,159	9,281	43,945	34,784
Upland Longleaf Pine Forest	13,678	85,252	152,775	29,510	92,601	203,431
Slash	0	71,189	39,358	703	1,489	85,222
Flatwoods	0	6,605	10,155	0	325	15,225
Dry Upland Hardwood Forest	9,469	10,375	93,342	6,590	26,375	91,072
Mesic Slope Forest	1,402	1,750	17,652	1,620	6,335	18,785
Floodplain Forest	2,942	24,278	129,861	4,458	12,798	145,345
National Forests in Mississippi Totals	37,770	420,487	697,506	57,194	205,295	889,063

B.2.8 Site Type Definitions

Within this document and the spreadsheet model a key grouping classification of vegetation is the site type on which the vegetation occurs. The site type is used as an indicator of appropriate vegetation based on the desired conditions for ecological systems. Site types are based on soils and landform characteristics. Soils were grouped by site type according to the crosswalk in Table B 59.

Table B 59. Site type – soil type crosswalk

Site Type	Soil Map Unit Name	Administrative Unit
Alluvial	Annemaine loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Alluvial	Ariel Silt Loam, occasionally flooded	Homochitto
Alluvial	Belden and Leeper silty clay loams	Holly Springs NF / Tombigbee NF
Alluvial	Bibb fine sandy loam frequently flooded	Bienville
Alluvial	Bibb, Trebloc and Leaf soils, 0-2 percent slopes, frequently flooded	Chickasawhay / De Soto
Alluvial	Bigbee loamy sand, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Alluvial	Bruno Sandy Loam, frequently flooded	Homochitto
Alluvial	Cahaba, Latonia and Bassfield soils, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Alluvial	Cascilla and Jena soils	Holly Springs NF / Tombigbee NF
Alluvial	Chenneby and Mathiston silt loams	Holly Springs NF / Tombigbee NF
Alluvial	Collins Silt Loam, occasionally flooded	Homochitto
Alluvial	Dorovan and Pamlico soils, 0-2 percent slopes, frequently flooded	Chickasawhay / De Soto
Alluvial	Falaya Silt Loam, occasionally flooded	Homochitto
Alluvial	Gillsburg and Mantachie soils	Holly Springs NF / Tombigbee NF
Alluvial	Gillsburg Silt Loam, occasionally flooded	Homochitto
Alluvial	Guyton loam, occasionally flooded	Bienville
Alluvial	Harleston fine sandy loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Alluvial	Houlka silty clay loam, occasionally flooded	Bienville
Alluvial	Iuka sandy loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Alluvial	Jena fine sandy loam, occasionally flooded	Bienville
Alluvial	Kirkville fine sandy loam, occasionally flooded	Bienville
Alluvial	Leeper clay loam, occasionally flooded	Bienville
Alluvial	Lenoir silt loam, 0-2 percent slopes, frequently flooded	Chickasawhay / De Soto
Alluvial	Mantachie sandy loam 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Alluvial	Mantachie silt loam, occasionally flooded	Bienville
Alluvial	Marietta fine sandy loam	Holly Springs NF / Tombigbee NF
Alluvial	Marietta silt loam, occasionally flooded	Bienville
Alluvial	Nugent loamy sand, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Alluvial	Oaklimeter and Collins silt loams	Holly Springs NF / Tombigbee NF
Alluvial	Ochlockonee and Jena sandy loams, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Alluvial	Ochlockonee-Kirkville complex	Holly Springs NF / Tombigbee NF
Alluvial	Quitman fine sandy loam, occasionally flooded	Bienville
Alluvial	Riverwash	Homochitto

Site Type	Soil Map Unit Name	Administrative Unit
Alluvial	Stough fine sandy loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Alluvial	Trebloc Silt Loam, frequently flooded	Homochitto
Alluvial	Typic Fluvaquents	Holly Springs NF / Tombigbee NF
Alluvial	Urbo and Una soils, frequently flooded	Bienville
Alluvial	Urbo silty clay loam, occasionally flooded	Bienville
Black Belt Prairie Soils	Demopolis silty clay loam	Holly Springs NF / Tombigbee NF
Black Belt Prairie Soils	Gullied land-Demopolis complex	Holly Springs NF / Tombigbee NF
Dry	Atwood silt loam	Holly Springs NF / Tombigbee NF
Dry	Benndale and Heidel soils, 8-15 percent slopes	Chickasawhay / De Soto
Dry	Cahaba fine sandy loam	Holly Springs NF / Tombigbee NF/ Bienville
Dry	Cahaba sandy loam	Homochitto
Dry	Gullied land-Smithdale complex	Holly Springs NF / Tombigbee NF
Dry	Heidel fine sandy loam	Bienville
Dry	Heidel sandy loam, 15-30 percent slopes	Chickasawhay / De Soto
Dry	Lexington silt loam, 8-17% slopes	Holly Springs NF / Tombigbee NF
Dry	Lucy and Wadley soils	Holly Springs NF / Tombigbee NF
Dry	Lucy loamy sand	Homochitto
Dry	Maben fine sandy loam and Sweatman silt lo	Holly Springs NF / Tombigbee NF
Dry	Maben loam and Sweatman fine sandy loam	Holly Springs NF / Tombigbee NF
Dry	Maben silt loam and Sweatman silt loam	Holly Springs NF / Tombigbee NF
Dry	McLaurin and Benndale fine sandy loams, 0-8 percent slopes	Chickasawhay / De Soto
Dry	Ruston and Lucedale soils, 0-8 percent slopes	Chickasawhay / De Soto
Dry	Shubuta fine sandy loam, 8-12 percent slopes	Chickasawhay / De Soto
Dry	Smithdale and Ruston soils	Holly Springs NF / Tombigbee NF
Dry	Smithdale fine sandy loam	Bienville /Holly Springs NF / Tombigbee NF
Dry	Smithdale fine sandy loam, 15-35 percent slopes, eroded	Chickasawhay / De Soto
Dry	Smithdale fine sandy loam, 8-15 percent slopes, eroded	Chickasawhay / De Soto
Dry	Smithdale-Rock outcrop sandstone complex	Bienville
Dry	Sweatman fine sandy loam	Bienville
Dry - Bienville and all compartments on Homochitto except: 202, 204-229, 231-233, 241-244	Ruston Fine Sandy Loam	Bienville /Homochitto
Dry - All compartments on Homochitto except: 202, 204-229, 231-233, 241-244	Saffell Gravelly Fine Sandy Loam	Homochitto

Site Type	Soil Map Unit Name	Administrative Unit
Dry - Holly Springs, Tombigbee, and all compartments on Homochitto except: 202, 204-229, 231-233, 241-244	Smithdale Sandy Loam	Homochitto/Holly Springs NF / Tombigbee NF
Dry to Mesic	Boswell fine sandy loam	Bienville
Dry to Mesic	Freest fine sandy loam	Bienville
Dry to Mesic	Freest fine sandy loam, 0-8 percent slopes	Chickasawhay / De Soto
Dry to Mesic	Freest-Susquehanna Complex, 5-12 percent slopes	Chickasawhay / De Soto
Dry to Mesic	Kolin silt loam, eroded	Homochitto
Dry to Mesic	Loring silt loam, 8-17 % slopes	Holly Springs NF / Tombigbee NF
Dry to Mesic	Lorman Silt Loam	Homochitto
Dry to Mesic	Lorman silt loam, 15-40 percent slopes	Chickasawhay / De Soto
Mesic	Oktibbeha silty clay loam	Bienville
Dry to Mesic	Ora fine sandy loam	Bienville
Dry to Mesic	Ora sandy loam	Holly Springs NF / Tombigbee NF
Dry to Mesic	Petal fine sandy loam, 8-20 percent slopes	Chickasawhay / De Soto
Dry to Mesic	Poarch, Malbis and Saucier soils, 0-8 percent slopes	Chickasawhay / De Soto
Dry to Mesic	Prentiss fine sandy loam, 0-5 percent slopes	Chick / DeSoto /HS NF / Tombigbee NF
Dry to Mesic	Providence silt loam, 8-15 % slopes	Holly Springs NF / Tombigbee NF
Dry to Mesic	Savannah fine sandy loam	Bienville /Holly Springs NF / Tombigbee NF
Dry to Mesic	Savannah fine sandy loam, 0-5 percent slopes	Chickasawhay / De Soto
Dry-mesic	Providence silt loam, 0-8% slopes	Homochitto
Dry-mesic	Providence silt loam, 0-8% slopes	Holly Springs NF / Tombigbee NF
Mesic	Bude Silt Loam	Homochitto
Mesic	Escambia and Basin soils, 0-3 percent slopes	Chickasawhay / De Soto
Mesic	Falkner silt loam	Bienville
Mesic	Falkner silt loam, 0-3 percent slopes	Chickasawhay / De Soto
Mesic	Ichusa silty clay loam	Bienville
Mesic	Kipling loam	Holly Springs NF / Tombigbee NF
Mesic	Kipling silt loam	Holly Springs NF / Tombigbee NF
Mesic	Lenoir silt loam, 0-2 percent slopes	Chickasawhay / De Soto
Mesic	Louin silty clay loam	Bienville
Mesic	Nahunta silt loam, 0-2 percent slopes	Chickasawhay / De Soto
Mesic	Stough fine sandy loam	Bienville
Mesic	Susquehanna fine sandy loam, 2-8 percent slopes	Chickasawhay / De Soto
Mesic	Susquehanna fine sandy loam, 8-15 percent slopes, eroded	Chickasawhay / De Soto
Mesic	Wilcox silt loam	Holly Springs NF / Tombigbee NF

Site Type	Soil Map Unit Name	Administrative Unit
Non-riverine Hydric Soils	Adaton silt loam	Bienville
Non-riverine Hydric Soils	Atmore, Plummer and Smithton soils, 0-2 percent slopes	Chickasawhay / De Soto
Prairie Soils	Maytag silty clay	Bienville
Prairie Soils	Okolona silty clay	Bienville
Upland Loess	Calloway-Grenada complex	Holly Springs NF / Tombigbee NF
Upland Loess	Gullied land - Loring Complex	Holly Springs NF / Tombigbee NF
Upland Loess	Gullied land-Providence complex	Holly Springs NF / Tombigbee NF
Upland Loess	Lexington silt loam, 2-8 % sloeps	Holly Springs NF / Tombigbee NF
Upland Loess	Lexington Silt Loam, Eroded	Homochitto
Upland Loess	Loring Silt Loam, 0-8% slopes	Homochitto
Upland Loess	Loring silt loam, 2-8 % slopes	Holly Springs NF / Tombigbee NF
Upland Loess	Memphis Silt Loam, Eroded	Homochitto
Upland Loess - Compartments: 202, 204-229, 231-233, 241-244	Ruston Fine Sandy Loam, combined with loess because the occurrence is not conducive to management separately	Homochitto
Upland Loess - Compartments: 202, 204-229, 231-233, 241-244	Saffell Gravelly Fine Sandy Loam, combined with loess because the occurrence is not conducive to management separately	Homochitto
Upland Loess - Compartments: 202, 204-229, 231-233, 241-244	Smithdale Sandy Loam, combined with loess because the occurrence is not conducive to management separately	Homochitto
Xeric	Eustis and Lakeland loamy sands, 0-8 percent slopes	Chickasawhay / De Soto
Xeric	Eustis and Lakeland soils, 15-30 percent slopes	Chickasawhay / De Soto
Xeric	Eustis and Lakeland soils, 8-15 percent slopes	Chickasawhay / De Soto
Xeric	Lakeland sand	Bienville
Xeric	Wadley fine sand, 0-8 percent slopes	Chickasawhay / De Soto

B.2.9 Emphasis Area Data Protocols for Vegetation Model

For the purpose of modeling, areas were grouped for which similar prescriptions could be implemented to meet management emphases. Table B 60 through Table B 66 provide information on the composition of these management emphasis areas by district. This information provided the basis for querying the FSVeg database to summarize acres by emphasis area for modeling also for summarizing acres by suitability category.

Table B 60. Bienville data protocols for vegetation model

Emphasis Area	Components	Land Class Code	Timber Suitability
Grow Only	Research Natural Area	330, 430	Not suitable for timber production.
Custodial Management	Recreation sites	850	
	Scenic area	310	
	Inadequate markets	822	
	Inaccessible right-of-way needed	823	
	Physical barriers	826	
	Road cost exceeds values	827	
	Threatened and endangered plants where ev_code not = 98 or 99	832	
Non-Forest Land	Administrative Sites	860	
	Wildlife openings	250	
	Special uses	240	
	Road and railroad right-of-way	230	
	Utility right-of-way	220	
	Non-forest land	200	
	River	140	
	Reservoir	120	
	Natural lake	110	
	Water area	100	
	Un-productive with ev_code =98 or 99	900	
	Threatened and endangered plants where ev_code = 98 or 99	832	
Red-cockaded Woodpecker Habitat Management Area Non-Old Growth Emphasis	Stands in habitat management area with old growth code not between 0 and 11 excluding grow only, custodial management and non-forest land	Land classes not included in grow only, custodial management or non-forest land land class codes above	Tentatively suitable for timber production.
Red-cockaded Woodpecker Habitat Management Area Old Growth Emphasis	Stands in habitat management area with old growth between 0 and 11 excluding grow only, custodial management and non-forest land		Tentatively suitable for timber production, but usually determined to be not appropriate for timber production.
General Forest Area Non-Old Growth Emphasis	Non-habitat management area stands with old growth not between 0 and 11 excluding grow only, custodial management and non-forest land		Tentatively suitable for timber production.
General Forest Area Old Growth Emphasis	Non-habitat management area stands with old growth between 0 and 11 excluding grow only, custodial management and non-forest land		Tentatively suitable for timber production, but usually determined to be not appropriate for timber production.

Table B 61. DeSoto data protocols for vegetation model

Emphasis Area	Components	Land Class Code	Timber Suitability
Grow Only	Research Natural Area	330, 430	Not suitable for timber production.
Custodial Management	Wild and Scenic River	360, 460	
	Restocking not assured	710	
	Irreversible damage	720	
	Recreation sites with ev_code not equal 0	850	
	Un-developed Recreation Sites	851	
	Administrative Sites	860	
	Un-developed Administrative Sites	861	
	Nursery	870	
	Seed Orchard with ev_code not equal 0	871	
	MIN Level Steep Slopes	821	
	Inaccessible right-of-way needed	823	
	MIN Level Sensitive Soils	824	
	MIN Level Low Level Management	825	
	Physical barriers	826	
	Road cost exceeds values	827	
	Threatened and endangered plants where ev_code not = 98 or 99	832	
	Other Rare/Endangered Species	846	
	Military Use	890	
	Unproductive Land	900	
Non-forest Land	Seed Orchard with ev_code = 0	871	
	Recreation Sites with ev_code = 0	850	
	Military Use	290	
	Pitcher Plant Bogs	251	
	Wildlife openings	250	
	Special uses	240	
	Road and railroad right-of-way	230	
	Utility ROW	220	
	Cemetary	210	
	Non-forest land	200	
	River	140	
	Reservoir	120	
	Natural lake	110	
	Water area	100	
Experimental Forest Non-Old Growth Emphasis	Harrison Experimental Forest with old growth code not between 0 and 11.	810	
Experimental Forest Old Growth Emphasis	Harrison Experimental Forest with old growth code between 0 and 11.	810	

Emphasis Area	Components	Land Class Code	Timber Suitability
Red-cockaded Woodpecker Habitat Management Area Non-Old Growth Emphasis	Stands in habitat management area with old growth code not between 0 and 11 excluding grow only, custodial management and non-forest land	Land classes not included in grow only, custodial management, non-forest land or experimental forest land class codes above	Tentatively suitable for timber production.
Red-cockaded Woodpecker Habitat Management Area Old Growth Emphasis	Stands in habitat management areas with old growth between 0 and 11 excluding grow only, custodial management and non-forest land		Tentatively suitable for timber production, but usually determined to be not appropriate for timber production.
General Forest Area Non-Old Growth Emphasis	Non- habitat management areas stands with old growth not between 0 and 11 excluding grow only, custodial management and non-forest land		Tentatively suitable for timber production.
General Forest Area Old Growth Emphasis	Non- habitat management areas stands with old growth between 0 and 11 excluding grow only, custodial management and non-forest land		Tentatively suitable for timber production, but usually determined to be not appropriate for timber production.

Table B 62. Homochitto data protocols for vegetation model

Emphasis Area	Components	Land Class Code	Timber Suitability
Grow Only	Research Natural Area	330	Not suitable for timber production.
Custodial Management	Restocking not assured where ev_code not = 98	710	
	Not Appropriate	800	
	Recreation sites with ev_code not equal 0	850	
	Un-developed Recreation Sites	851	
	Physical barriers	826	
Non-Forest Land	Administrative Sites	860	
	Undeveloped Administrative Sites	861	
	Wildlife openings	250	
	Special uses	240	
	Road and railroad right-of-way	230	
	Utility right-of-way	220	
	Non-forest land	200	
	River	140	
	Reservoir	120	
	Natural lake	110	
	Water area	100	
	Restocking not assured where ev_code not = 98	710	

Emphasis Area	Components	Land Class Code	Timber Suitability
Red-cockaded Woodpecker Habitat Management Area Non-Old Growth Emphasis	Stands in habitat management areas with old growth code not between 0 and 11 excluding grow only, custodial management and non-forest land	Land classes not included in Grow Only, Custodial Management or Non-Forest Land land class codes above	Tentatively suitable for timber production.
Red-cockaded Woodpecker Habitat Management Area Old Growth Emphasis	Stands in habitat management areas with old growth between 0 and 11 excluding grow only, custodial management and non-forest land		Tentatively suitable for timber production, but usually determined to be not appropriate for timber production.
General Forest Area Non-Old Growth Emphasis	Non- habitat management areas stands with old growth not between 0 and 11 excluding grow only, custodial management and non-forest land		Tentatively suitable for timber production.
General Forest Area Old Growth Emphasis	Non- habitat management areas stands with old growth between 0 and 11 excluding grow only, custodial management and non-forest land		Tentatively suitable for timber production, but usually determined to be not appropriate for timber production.

Table B 63. Chickasawhay data protocols for vegetation model

Emphasis Area	Components	Land Class Code	Timber Suitability
Grow Only	Research Natural Area and Botanical Areas	430	Not suitable for timber production
Custodial Management	Not Appropriate	800	
	Sensitive Soils	824	
	Recreation sites with ev_code not equal 0	850	
	Un-developed Recreation Sites	851	
	Physical barriers	826	
	Administrative Sites	860	
Non-Forest Land	Wildlife openings	250	
	Special uses	240	
	Road and railroad right-of-way	230	
	Utility right-of-way	220	
	Public Park, Cemetery	210	
	Non-forest land	200	
	Reservoir	120	
	Natural lake	110	
	Threatened and Endangered plants where ev_code =98	832	

Emphasis Area	Components	Land Class Code	Timber Suitability
Red-cockaded Woodpecker Habitat Management Area Non-Old Growth Emphasis	Stands in habitat management areas with old growth code not between 0 and 11 excluding grow only, custodial management and non-forest land	Land classes not included in Grow Only, Custodial Management or Non-Forest Land land class codes above	Tentatively suitable for timber production.
Red-cockaded Woodpecker Habitat Management Area A Old Growth Emphasis	Stands in habitat management areas with old growth between 0 and 11 excluding grow only, custodial management and non-forest land		Tentatively suitable for timber production, but usually determined to be not appropriate for timber production.

Table B 64. Delta data protocols for vegetation model

Emphasis Area	Components	Land Class Code	Timber Suitability
Grow Only	Research Natural Area and Botanical Areas	330, 430	Not suitable for timber production
	Historical Areas	320	
Custodial Management	Slough Buffers	820, 828	
	Recreation sites with ev_code not equal 0	850	
Non-Forest Land	Administrative Sites	860	
	Undeveloped Recreation Sites with ev_code not = 0	851	
	Wildlife openings	250	
	Special uses	240	
	Road and railroad right-of-way	230	
	Utility right-of-way	220	
	Non-forest land	200	
General Forest Area Non-Old Growth Emphasis	Standard forest land, old growth code not between 0-11	500	Tentatively suitable for timber production.
	Wildlife emphasis, old growth code not between 0 -11	650	
	Key Area for Wildlife, old growth code not between 0-11	510	
	Contains threatened and endangered plants, old growth code not between 0 -11	512	
General Forest Area Old Growth Emphasis	Non- habitat management areas stands with Old Growth between 0 and 11 excluding Grow Only, Custodial Management and Non-Forest Land		Tentatively suitable for timber production, but usually determined to be not appropriate for timber production.
	Standard forest land, old growth code between 0 -11	500	
	Late Serial, old growth code between 0 - 11	600	
	Wildlife emphasis, old growth code between 0 -11	650	
	Key Area for Wildlife, old growth code between 0 -11	510	
	Contains threatened and endangered plants, old growth code between 0 -11	512	

Table B 65. Holly Springs data protocols for vegetation model

Emphasis Area	Components	Land Class Code	Timber Suitability
Grow Only	Research Natural Area and Botanical Areas	430	Not suitable for timber production
Custodial Management	Recreation sites with ev_code not equal 0	850	
	Restocking not assured	710	
	Irreversible damage	720	
	Response info lacking	740	
	MIN Level Sensitive Soils	824	
	MIN Level Low Level Management	825	
	Physical barriers	826	
	Administrative Sites with ev_code not = 0	860	
	Un-developed Administrative Sites with ev_code not = 0	861	
	Unproductive Land with ev_code > 0 and < 98	900	
Non-Forest Land	Administrative Sites with ev_code = 0	860	
	Wildlife openings	250	
	Special uses	240	
	Road and railroad right-of-way	230	
	Utility right-of-way	220	
	Non-forest land	200	
	Stream	150	
	Reservoir	120	
	Natural lake	110	
	Water area	100	
	Unproductive with ev_code 0, 98 or 99	900	
Experiment-al Forest Non-Old Growth Emphasis	Tallahatchie Experimental Forest with old growth code not between 0 and 11.	810	
Experiment-al Forest Old Growth Emphasis	Tallahatchie Experimental Forest with old growth code between 0 and 11.	810	
General Forest Area Non-Old Growth Emphasis	Lands with old growth code not between 0 -11 excluding lands in grow only, custodial, experimental forest or non-forest land	Land classes not included in grow only, custodial, experimental forest or non-forest land	Tentatively suitable for timber production.
General Forest Area Old Growth Emphasis	Lands with old growth code between 0 -11 excluding lands in grow only, custodial, experimental forest or non-forest land		Tentatively suitable for timber production, but usually determined to be not appropriate for timber production.

Table B 66. Tombigbee data protocols for vegetation model

Emphasis Area	Components	Land Class Code	Timber Suitability
Grow Only	Research Natural Area and Botanical Areas	330, 430	Not suitable for timber production
	Geological / Archeological Areas	340	
Custodial Management	Recreation sites with ev_code not equal 0	850	
	Not Appropriate MIN Level	820	
	Not Appropriate MIN Level Steep Slopes	821	
	Unproductive Land with ev_code > 0 and < 98	900	
Non-Forest Land	Administrative Sites with ev_code = 0	860	
	Wildlife openings	250	
	Special uses	240	
	Road and railroad right-of-way	230	
	Utility right-of-way	220	
	Public Park, cemetery	210	
	Non-forest land	200	
	Reservoir	120	
	Water area	100	
	Unproductive with ev_code 0, 98 or 99	900	
General Forest Area Non-Old Growth Emphasis	Lands with old growth code not between 0 -11 excluding lands in grow only, custodial, or non-forest land	Land classes not included in grow only, custodial, or non-forest land	Tentatively suitable for timber production.
General Forest Area Old Growth Emphasis	Lands with old growth code between 0 -11 excluding lands in grow only, custodial, or non-forest land	Land classes not included in grow only, custodial, or non-forest land	Tentatively suitable for timber production, but usually determined to be not appropriate for timber production.

B.3 Social and Economic

B.3.1 Social Economic Impact Analyses

The Model

Economic effects to local counties were estimated using an economic input-output model developed with IMPLAN 3.0 (IMPLAN). IMPLAN (Impact Analysis for Planning) is a software package for personal computers that uses the latest national input-output tables from the Bureau of Economic Analysis, as well as data from the Bureau of Labor Statistics and the Census Bureau. The software was originally developed by the Forest Service and is now maintained by the Minnesota IMPLAN Group, Inc (MIG). Data used for the impact analysis was from secondary data for those counties considered to be in the forest's impact area. The forest's zone of economic influence was delineated using a standard Forest Service protocol (Retzlaff, 2010).

Forest Contribution and Economic Impact Analyses

The IMPLAN model was used to assess the economic contributions of the National Forests in Mississippi. Economic contribution is a way of assessing the degree to which current forest management supports regional and local economies. An impact analysis, on the other hand, describes what happens under different management strategy alternatives. The impact of changes in final sales stemming from management actions are measured by changes in employment and income. Economic impacts were estimated for 2015, using the expenditure data for recreation, wildlife, and hunting (U.S. Forest Service's national visitor use monitoring data) and harvest volume estimates for timber.

Impacts to local economies are measured in two ways: employment and labor income. Employment is expressed in number of jobs. A job can be seasonal or year-round, full-time or part-time. The income measure used was labor income expressed in 2009 dollars. Labor income includes both employee compensation (pay plus benefits) and proprietor's income (e.g. self-employed).

Data Sources

IMPLAN, an "input-output" model produces a linear relationship so that impact estimates need only be calculated once per model and then applied to the direct change in final demand for each alternative. A Forest Service-developed spreadsheet known as "FEAST" (Forest Economic Analysis Spreadsheet Tool) was used to apply the IMPLAN impact results to each alternative, expressed in units of output. FEAST transformed the dollar impact for a given industry from IMPLAN to the resource output by alternative into a specific employment and income estimate. Specifications for developing IMPLAN impact estimates (response coefficients) and levels of dollar activity are stated below.

Timber

Volume Data – Volume data was derived from cut and sold reports and estimates from the timber staff, by alternative.

Use of the Model –Data from the forest shows that only 63 percent of the timber volume was processed in the study area. Most of the timber volume (40 percent) was processed by pulp mills, about 25 percent was processed by saw mills, 20 percent by veneer mills and the remainder by chip board and pole mills. Impacts represent the economic activity occurring in all backward linking sectors associated with the final demand output of the timber industries described above.

Recreation

Recreation visits include hunting and fishing as well activities such as hiking, camping, horseback riding, and viewing scenery. Recreation visits were derived from the national visitor use monitoring survey that is done for one-quarter of national forests each year. The National Forests in Mississippi were surveyed in 2009. The resulting calculations yielded visits for local and non-local, day use, on national forest overnight use, and off national forest overnight use. These use metrics were entered into FEAST to link with IMPLAN impact response coefficients to yield an impact for recreation and wildlife resources.

Spending Segments

The spending that occurs on a recreation trip is greatly influenced by the type of recreation trip taken. For example, visitors on overnight trips away from home typically have to pay for some form of lodging (e.g., hotel/motel rooms, fees in a developed campground, etc.) while those on day trips do not. In addition, visitors on overnight trips will generally have to purchase more food during their trip (in restaurants or grocery stores) compared to day-use visitors. Visitors who have not traveled far from home to the recreation location usually spend less money than visitors traveling longer distances, especially on items

such as fuel and food. Analysis of spending patterns has shown that a good way to construct segments of the visitor market with consistent spending patterns is to use the following seven groupings:

1. local visitors on day trips,
2. local visitors on overnight trips staying in lodging on the national forest,
3. local visitors on overnight trips staying in lodging off the national forest,
4. non-local visitors on day trips,
5. non-local visitors on overnight trips staying in lodging on the national forest,
6. non-local visitors on overnight trips staying in lodging off the forest, and
7. non-primary visitors (visits to the National Forests in Mississippi were not the primary destination for the visit).

Table B 67 shows the distribution of visits by spending segment (data from the National Forests in Mississippi NVUM Report, 2011).

Table B 67. Distribution (percentage) of National Forest visits[a] by spending segment[b] on the National Forests in Mississippi

	Non-local Segments			Local Segments			Non-Primary[c]	Total
	Day	Overnight on NF	Overnight off NF	Day	Overnight on NF	Overnight off NF		
Percent of National Forest Visits[a]	8	3	1	81	2	1	4	100

a - A National Forest visit is defined as the entry of one person onto a national forest to participate in recreation activities for an unspecified period of time. A National Forest Visit can be composed of multiple Site Visits.

b - The market segments shown here relate to the type of recreation trip taken. A recreation trip is defined as the duration of time beginning when the visitor left their home and ending when they got back to their home. “Non-local” trips are those where the individual(s) traveled greater than approximately 50 miles from home to the site visited. “Day” trips do not involve an overnight stay outside the home, “overnight on-forest” trips are those with an overnight stay outside the home on National Forest System (NFS) land, and “overnight off-forest” trips are those with an overnight stay outside the home off National Forest System land.

c - “Non-primary” trips are those where the primary recreation destination of the trip was somewhere other than the national forest under consideration.

Table B 67 shows that over 80 percent of the visits to the National Forests in Mississippi are local area residents on day trips away from home. Less than 7 percent of the visits are made by people who are on trips that include a night away from home. According to data from the 2011 National Visitor Use Monitoring Report, about half of the visiting parties spend $40 or less per party per visit. Almost 70 percent of the visiting population comes from households in the $25,000 to $49,999 range; nearly a quarter are from households with incomes less than $25,000; and only about 1.2 percent comes from households in the $75,000 to $99,999 range.

Federal Expenditures and Employment

Expenditure Data – A forest budget was estimated for each alternative, and these estimates were used for forest expenditures, some of which had local economic effects. The proportion of funds spent by program varied by alternative according to the themes emphasized for that alternative. Forest Service employment was estimated by the forest staff based on examination of historical Forest Service obligations.

Use of the Model – To obtain an estimate of total impacts from Forest Service spending, salary and non-salary portions of the impact were handled separately. Non-salary expenditures were determined by using

budget object code information from the National Finance Center. This profile was run through the model for non-salary expenditures per one million dollars, and the results multiplied by total forest non-salary expenditures. FEAST was again used to make the calculations. Salary impacts result from forest employees spending a portion of their salaries locally. IMPLAN includes a profile of personal consumption expenditures for several income categories.

Revenue Sharing – Secure Rural Schools Payments

Expenditure Data – On October 3, 2008, the Secure Rural Schools and Community Self-Determination Act of 2000 was reauthorized as part of Public Law 110-343. The new Secure Rural Schools Act has some significant changes. To implement the new law, the Forest Service requested states and counties to elect either to receive a share of the 25-percent rolling average payment or to receive a share of the Secure Rural Schools State (formula) payment. A county electing to receive a share of the State payment that is greater than $100,000 annually is required to allocate 15 to 20-percent of its share for one or more of the following purposes: projects under Title II of the Act; projects under Title III; or return the funds to the Treasury of the United States.

Use of the Model – Title I funds were allocated to roads and schools using the national expenditure profile for state/local government education (schools) and local model estimates for road construction. In IMPLAN, $1 million of each profile was used to obtain a response coefficient for Title I Forest Service payments to impact area counties. A response coefficient for Title II funds was estimated by running 1 million dollars through the Forestry Services Sector Title III funds are given directly to state and local governments.

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Appendix C - Analysis of Potential Wilderness Areas and Evaluation of Potential Wild and Scenic Rivers Inventory

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Appendix C
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Appendix C - Analysis of Potential Wilderness Areas and Evaluation of Potential Wild and Scenic Rivers Inventory

C.1 Analysis of Potential Wilderness Areas

C.1.1 Introduction

As part of the forest plan revision process, the National Forests in Mississippi (Forests) conducted a forestwide inventory of potential wilderness areas that may be suitable for recommendation for congressional designation as wilderness study areas. Areas qualify for placement on the potential wilderness inventory if they meet the statutory definition of wilderness. Forest Service Handbook (FSH) 1909.12 chapter 71 prescribes inventory criteria used to determine if an area meets the statutory definition of wilderness.

The inventory of all National Forest System (NFS) lands for potential wilderness study area recommendations included:

- Consideration of possible additions to existing wilderness areas,
- Re-evaluation of study areas identified in the Roadless Area Review and Evaluation (RARE II) of 1979,
- Analysis of areas proposed by individuals and groups during the forest plan revision process, and
- A GIS-based forestwide analysis of NFS administered lands to identify potential wilderness areas based upon FSH 1909.12 chapter 71 inventory criteria.

C.1.2 Background

The National Forests in Mississippi were established in the 1930s from lands that were previously under private ownership and, in many cases, had been heavily farmed and logged. The patchwork of private and public lands that still characterize the National Forests in Mississippi means that few areas are undisturbed or unaffected by nearby human habitation. With almost 3,000 miles of forest system roads that provided access to the national forest and many of the system roads also serve as through routes to private lands, potential roadless areas are limited in size and extent on the Forests.

A comprehensive process, instituted in June 1977 (by the Department of Agriculture), to identify roadless and undeveloped land areas in the National Forest System and to determine their general uses for both wilderness and other resource management and development was completed in January 1979. This Roadless Area Review and Evaluation (RARE II) identified three areas in Mississippi for potential wilderness evaluation. The areas identified in the 1979 RARE II process were Sandy Creek (08310), Black Creek (08311) and Leaf (08312). The Black Creek and Leaf were recommended for wilderness in the RARE II process and were subsequently designated as wilderness areas by Congress 1984. Upon passage of the Mississippi National Forest Wilderness Act of 1984 (Public Law 98-515 –October 19, 1984) the Black Creek and Leaf Wilderness Areas were added to the national wilderness preservation system. Sandy Creek a 2,375-acre RARE II roadless inventory area (on the Homochitto National Forest) was identified as needing further planning for all uses including wilderness in the RARE II process. The Mississippi National Forest Wilderness Act of 1984 released the Sandy Creek further planning area to multiple use management; however the Act and agency policy required review of the wilderness option for Sandy Creek when the forest plan was revised. This evaluation report documents that review and

includes a comprehensive review of all potential wilderness study areas on NFS land administered by the National Forests in Mississippi.

C.1.3 Identification of Potential Wilderness Areas

Based on direction in FSH 1909.12, chapter 70, section 71, the first step in analyzing potential wilderness during forest plan revision was to identify and inventory all areas within NFS lands that satisfied the definition of wilderness in section 2(c) of the 1964 Wilderness Act. Although the inventory criteria generally focused on large tracts of land (over 5,000 acres) with little evidence of structural improvements, additional criteria were considered for lands in the Eastern United States (including Mississippi) that may have been acquired from private ownership and show signs of human activity.

In addition to using the criteria in FSH 1909.12, sections 71.1 and 71.11 for identifying potential wilderness areas, the Forests also considered the following criteria in section 71.12 for potential wilderness east of the 100th meridian:

1. The land is regaining a natural, untrammeled appearance.
2. Improvements existing in the area are being affected by the forces of nature rather than humans and are disappearing or muted.
3. The area has existing or attainable NFS ownership patterns, both surface and subsurface, that could ensure perpetuation of identified wilderness characteristics.
4. The location of the area is conducive to the perpetuation of wilderness values.
5. Each area contains no more than a half mile of forest roads under Forest Service jurisdiction for each 1,000 acres.
6. No more than 15 percent of the area is in non-native, planted vegetation.
7. Twenty percent or less of the area has been harvested within the past 10 years.
8. The area contains only a few dwellings on private lands and the location of these dwellings and their access needs insulate their effects on wilderness characteristics on NFS lands.

Using these criteria, the Forests conducted an analysis of existing wilderness areas, RARE II study areas, areas proposed by the public during forest plan revision, and an overall forestwide review of any large tracts of land that could be potential wilderness areas. The summaries below provide an overview of the results from these analyses. Additional details and maps for each potential area considered are provided in the attachments which follow.

C.1.4 Summary of Results

Consideration of Possible Additions to Existing Wilderness Areas

The National Forests in Mississippi have two existing designated wilderness areas—the Black Creek Wilderness and Leaf Wilderness. Both of these wilderness areas are located on the De Soto National Forest in southern Mississippi and were established in 1984. Changes in land ownership around both wilderness areas were reviewed in 2008 to see if there were any appropriate areas for potential expansion. Although there were no opportunities for expansion of the Leaf Wilderness, several tracts surrounding the Black Creek Wilderness have been acquired by the Forest Service in recent years. There are approximately 250 acres of possible additions to the Black Creek Wilderness. While these acres do not meet criteria for inclusion in the inventory of potential wilderness, they could become a part of the inventory pending a change in the status of the mineral rights for these acres.

Re-evaluation of RARE II Study Areas

In the RARE II evaluation for Mississippi in 1979, Sandy Creek was identified for "further planning." In 2008, as part of the forest plan revision process, Sandy Creek was again re-evaluated and the area did not meet the statutory definition of wilderness based upon FSH 1909.12 chapter 70, section 71 inventory criteria. However, approximately 300 acres of the Sandy Creek area has been proposed in the revised forest plan for designation as a special botanical area.

Analysis of Areas Proposed during the Forest Plan Revision Process

During the forest plan revision process, members of the public proposed three potential wilderness areas. Two areas were located on the Delta National Forest (Ten-Mile Bayou and Six-Mile Bayou), and one area was proposed on the Tombigbee National Forest (Hawk's Nest). Each area was individually considered using guidance in FSH 1909.12, chapter 70. None of the three areas qualified for placement on the potential wilderness inventory. The areas did not meet the criteria prescribed in FSH 1909.12 (part 71.12) to qualify as lands that have potential for wilderness recommendation.

GIS-based Forestwide Analysis of Potential Wilderness Areas

In addition to the above reviews, the National Forests in Mississippi utilized resource data from the 2008 GIS database as a tool to conduct a district-by-district analysis of any large blocks of land that would warrant further consideration as potential wilderness areas. The screening followed FSH 1909.12, chapter 70 criteria and was focused on large blocks of contiguous lands (1,000 acres or larger) that had little evidence of human activity and would provide a sense of remoteness and solitude. No areas greater than 5,000 acres were identified in the screening process. Collectively across the Forests, 16 areas were identified as being over 1,000 acres in size with a road density of less than one-half mile per 1,000 acres. However, none of these areas were found to qualify for the inventory of potential wilderness areas based upon FSH 1909.12, chapter 70, sections 71.1, 71.11 and 71.12 criteria.

C.1.5 Conclusions

Based on findings in the above described analysis there were no areas found on the Forests that qualified for placement on the potential wilderness inventory.

C.2 Consideration of Possible Additions to Existing Wilderness Areas

C.2.1 Black Creek Wilderness Area

The Black Creek Wilderness on the De Soto National Forest was established on October 19, 1984, by presidential approval of Public Law 98-515. The wilderness area contains approximately 5,052 acres. Land acquisitions (totaling approximately 252 acres) along the perimeter of the proclaimed wilderness have further consolidated Federal ownership in recent years. These acquired tracts are forested with few if any roads (as seen on aerial photography). However, both parcels have 100 percent of their areas encumbered by 3rd party mineral rights.

To qualify these areas for placement on the potential wilderness inventory, appropriate occupancy provisions that would maintain the areas in a condition suitable for wilderness would need to be developed and agreed upon by the affected parties. Until such provisions are developed these areas do not qualify for placement on the potential wilderness inventory. However, national forest management activities in these areas should be directed towards perpetuation of wilderness characteristics such that

they may eventually qualify for placement on the potential wilderness inventory and be considered as possible additions to the wilderness area.

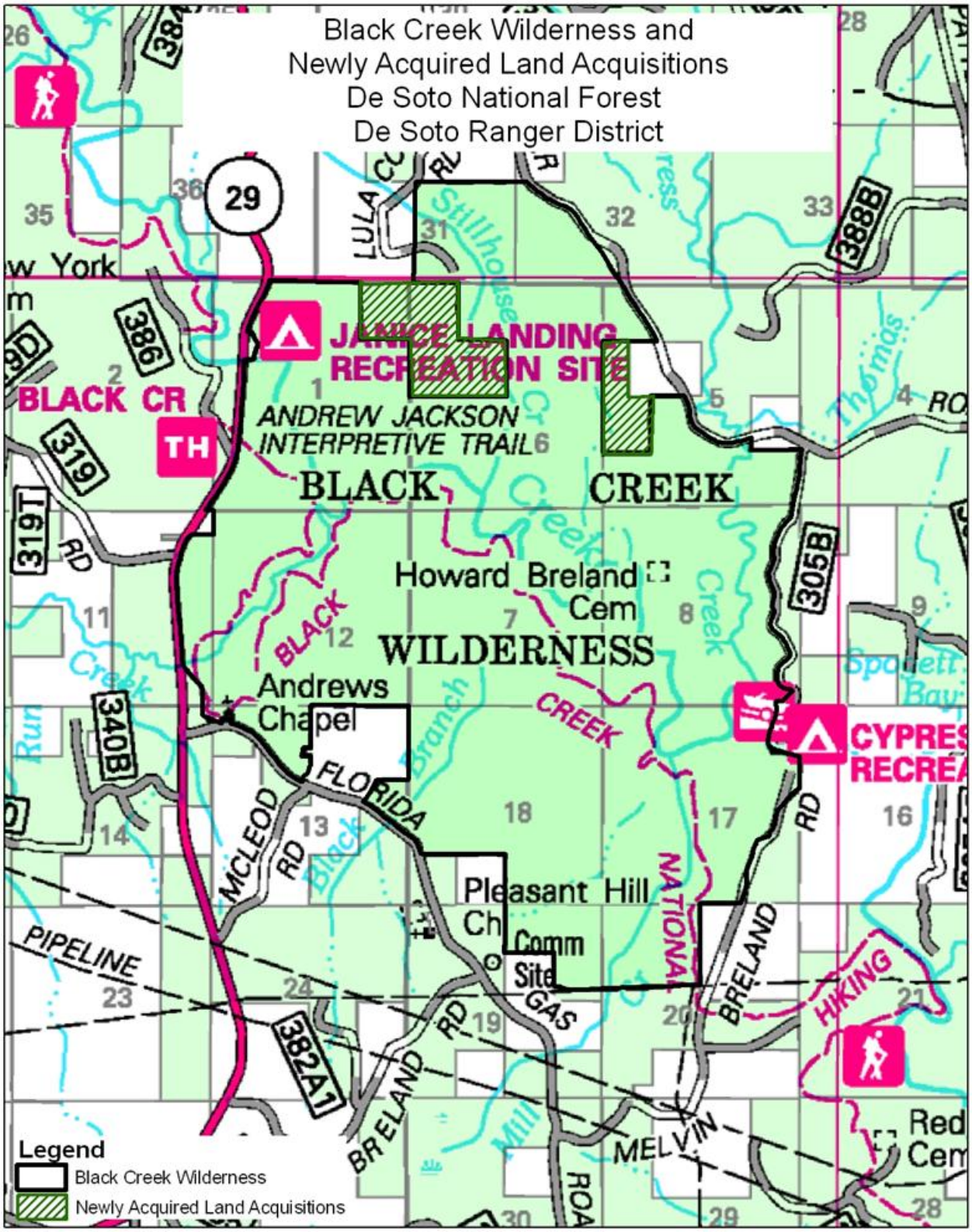


Figure C 1. Map of Black Creek Wilderness area

C.2.2 Leaf Wilderness Area

The Leaf Wilderness on the De Soto National Forest was established in the same legislation as the Black Creek Wilderness in 1984. There have been no land acquisitions within or adjacent to the proclaimed wilderness. This small 994-acre wilderness area is constrained from future expansion on the north or east by the National Forests in Mississippi proclamation boundary. Roads will limit future expansion to the west, and railroads will limit expansion south.

Figure C 2. Map of Leaf Wilderness area

C.3 Re-Evaluation of RARE II Study Areas

C.3.1 Sandy Creek RARE II Area

An area on the Homochitto National Forest known as Sandy Creek was identified along with Black Creek and Leaf as areas with potential wilderness characteristics in the national Roadless Area Review and Evaluation (RARE II) evaluation in 1979. During the period of 1978-1984, all three areas were further analyzed. Black Creek and Leaf areas were recommended as wilderness areas, and Sandy Creek was identified for "Further Planning." On October 19, 1984, the Mississippi Wilderness Act (P.L. 98-515) established both the Black Creek and Leaf Wilderness Areas. The Sandy Creek RARE II Area did not meet the criteria for wilderness based on road density, access required to private land, and significant past management. Accordingly, Sandy Creek was released to multiple use management by the Mississippi National Forest Wilderness Act of 1984.

As part of the forest plan revision process, the Sandy Creek RARE II area was reviewed once again, using criteria established in FSH 1909.12, chapter 70. The analysis is documented in Table C 1. The results demonstrate that several of the chapter 70 criteria for potential wilderness areas east of the 100th Meridian are not met for Sandy Creek, specifically:

- Section 71.11.10 – There are 1.4 miles of cleared power line right-of-way within the RARE II area and an additional 2.4 miles of transmission line forms the north boundary line of the area.
- Section 71.12.1 - The proposed area shows evidence of being "trammeled" by man (roads, pipelines and power lines).
- Section 71.12.2 - Each of the improvements listed in 71.12.1 is actively being managed therefore, they show little or no evidence of past human impacts being muted or disappearing by natural forces.
- Section 71.12.5 – There are 11.45 miles of Forest Service roads within the area which equates to a road density of 4.7 miles per 1,000 acres.

Other Forest Service observations and concerns include the following:

- Wilderness experiences such as solitude, serenity, adventure and self-reliance would only be attainable after major restoration of 11.45 miles of interior roads.
- Special features are limited with the exception of the 300-acre proposed Sandy Creek Botanical Area.
- The proposed wilderness lies entirely in the Sandy Creek Wildlife Management Area, a cooperative special use with the Mississippi Department of Wildlife, Fisheries and Parks (MDWFP).
- The proposed area currently experiences high interest by the general public for dispersed recreation opportunities, including hunting and fishing.

In summary, several notable criteria in FSH 1909.12, chapter 70 for wilderness designation are not met as documented in this analysis. After reviewing these criteria for potential wilderness attributes as outlined in FSH 1909.12, chapter 70, the Sandy Creek RARE II further study area does not meet the statutory definition of wilderness and therefore does not qualify for placement in the inventory of potential wilderness.

C.4 Re-evaluation of RARE II Study Areas

C.4.1 Sandy Creek RARE II Area Homochitto National Forest

A portion of the Homochitto National Forest, Sandy Creek was identified and selected as an area with potential wilderness characteristics and placed on the RARE II list in 1977. During the period of 1978-1984 Sandy Creek was further analyzed based on road density, access required to private lands, and

significant past management and found to not meet wilderness criteria. It was released to multiple use management by the Mississippi Wilderness Act of 1984 (P.L. 98-515, October 19, 1984).

The following table provides analysis results for the Sandy Creek RARE II area based on wilderness criteria (FSH 1909.12, chapter 71) for inclusion in the inventory of potential wilderness areas.

Table C 1. Sandy Creek RARE II Area

Directive	Criteria	Comments	Determination
71.1 – Inventory Criteria	**Potential wilderness areas qualify for placement on the inventory of potential wilderness if they meet one or more of the following:**		
	1. They contain 5000 acres or more.	The RARE II Study area contains 2,428 acres	Proposed area is less than 5,000 acres.
	2. They contain less than 5,000 acres but:		
	a.) Due to physical terrain, natural conditions can be preserved	The area is bounded by man-made utility lines, roads and property boundaries. The only natural boundary is Sandy Creek along the NW flank.	This criterion is not met.
	b.) They are self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System.	The RARE II Study area is not a self-contained ecosystem.	This criterion is not met.
	c.) They are contiguous to existing wilderness, primitive areas, administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size.	The RARE II Study area is not contiguous to existing wilderness, primitive areas or other potential wilderness in FS or other ownership.	This criterion is not met.
	3. The area does not contain forest roads (36 CFR 212.1) or other permanently authorized roads, except as permitted in areas east of the 100th meridian (FSH 1909.12, sec. 71.12)	See section 71.12, criterion #5, later within this table	See section 71.12, criterion #5

Directive	Criteria	Comments	Determination
71.11 - Criteria for including improvements	**Potential wilderness areas may qualify for the inventory even though they include the following types or areas or features.**		
	1. Airstrips and heliports.	None within area.	N/A
	2. Cultural treatments involving plantations or plantings where the use of mechanical equipment is not evident.	There are 3 small plantations from bug spots with evidence of mechanical equipment.	There is some evidence of mechanical planting.
	3. Electronic installations, such as cell towers, television, radio, and telephone repeaters, and the like, provided their impact is minimal.	There are none.	There are no communication or electronic installations in the area.
	4. Areas with evidence of historic mining (50+ years ago). Inventoried lands that may have potential for wilderness recommendation may include:		
	a. Areas that otherwise meet inventory criteria if they are covered by mineral leases having a “no surface occupancy” stipulation.	The only portion of the RARE II Area with a “no surface occupancy” stipulation is the 300 ac. “Sandy Creek Proposed Botanical Area”.	Most of the area allows for surface occupancy.
	b. Areas covered by mineral leases that otherwise meet inventory criteria only if the lessee has not exercised development and occupancy rights. If and when these rights are exercised, remove the area, or portion affected, from the inventory unless it is possible to establish specific occupancy provisions that would maintain the area in a condition suitable for wilderness.	There are several mineral leases; however, no activity as of 11/10/08. Previous well and tank batteries have been removed and the areas restored. One 1.5 mile pipeline still exists in the area underground.	One 1.5 mile pipeline still exists in the area underground.
	5. National Grasslands and Prairies. National Grasslands and Prairies may have structures or evidence of vegetative manipulation resulting from past management practices. National Grassland and Prairie lands that contain the following features may be inventoried:		
	a. Vegetation type conversions that are reverting to native vegetation with minimal evidence of cultivation.	N/A	N/A
	b. Less than 1 mile of interior fence per section	N/A	N/A
	6. Areas of less than 70-percent Federal ownership, if it is realistic to manage the Federal lands as wilderness, independent of the private land.	There is a 424-acre tract of 16th section land in the north central portion of Sandy Creek RARE II; the RARE II boundary excludes this tract.	As shown on the map, with the exclusion of the 16th section tract, the RARE II area is 100% Federal ownership.
	7. Minor structural range improvements (FSM 2240.5) such as fences or water troughs. Exclude areas where nonstructural range improvements are readily visible and apparent.	There are no range improvements within the proposed area.	Wilderness potential is not impacted by range improvements.

Directive	Criteria	Comments	Determination
71.11 - Criteria for including improvements (cont'd)	8. Recreation improvements such as occupancy spots or minor hunting or outfitter camps. As a general rule, do not include developed sites. Areas with minor, easily removable recreation developments may be included.	There are no recreation improvements within the Sandy Creek RARE II area.	Wilderness potential is not impacted by existing recreation improvements.
	9. Timber harvest areas where logging and prior road construction are not evident, except as provided in Section 71.12 for areas east of the 100th meridian.	See section 71.12, criterion #7, later within this table.	See section 71.12, criterion #7.
	10. Ground-return telephone lines, electric lines and powerlines, if a right-of-way has not been cleared.	There is 1.4 mi. of powerline in the SE corner of the RARE II area; 2.4 miles of powerline forms the north boundary line of the area.	This wilderness criterion is not met regarding existing cleared powerline right-of-ways.
	11. Watershed treatment areas if the use of mechanical equipment is not evident. The inventory may include areas where minor watershed treatment has been accomplished manually, such as small hand-constructed gully plugs.	There are no watershed treatment areas.	Wilderness potential is not impacted by existing watershed treatment area.

Directive	Criteria	Comments	Determination
71.12 - Criteria for Potential Wilderness Areas East of the 100th Meridian	**National Forest System lands in the Eastern United States (east of the 100th meridian) have been acquired over time from private ownership. Criteria for inventorying those lands that may have potential for wilderness recommendation recognize that much, if not all of the land, shows some signs of human activity and modification even though they have shown high recuperative capabilities. Areas east of the 100th meridian qualify for inventory as lands that may have potential for wilderness recommendation if:**		
	1. The land is regaining a natural, untrammeled appearance.	Area has a history of forest management. There are roads, utilities and pipelines. The public has a history of using the area for hunting.	The proposed area shows evidence of being "trammeled" by man.
	2. Improvements existing in the area are being affected by the forces of nature rather than humans and are disappearing or muted.	Management by humans is evident in the roads, pipeline and powerlines	This criterion is not met.
	3. The area has existing or attainable NFS ownership patterns, both surface and subsurface, that could ensure perpetuation of identified wilderness characteristics.	No outstanding/reserved minerals in the Sandy Creek RARE II area.	This criterion is met.
	4. The location of the area is conducive to perpetuation of wilderness values. Consider the relationship of the area to sources of noise, air and water pollutions, as well as the unsightly conditions that would have an affect on the wilderness experience. The amount and pattern of Federal ownership is also a factor.	The entire western boundary of the RARE II area is private land, and a small section of private borders FS along the SE corner.	Considerable private land borders the RARE II area (approx. one third of the perimeter). There is no control of activities occurring on private land.
	5. The area contains no more than a half mile of improved road for each 1,000 acres, and the road is under Forest Service jurisdiction.	There are 11.45 miles of FS roads within the 2,428 acre RARE II Area; this equates to 4.7 miles per 1000 acres.	This criterion is not met.
	6. No more than 15 percent of the area is in non-native, planted vegetation.	There is no non-native, planted vegetation within the RARE II area.	This criterion is met.
	7. Twenty percent or less of the area has been harvested within the past 10 years.	There is only one 97 acre stand that is less than 10 years old, this equates to only 4% of the total area.	This criterion is met.
	8. The area contains only a few dwellings on private lands and the location of these dwellings and their access needs insulate their effects on wilderness characteristics	There are no dwellings on FS or the 16th section land.	This criterion is met.

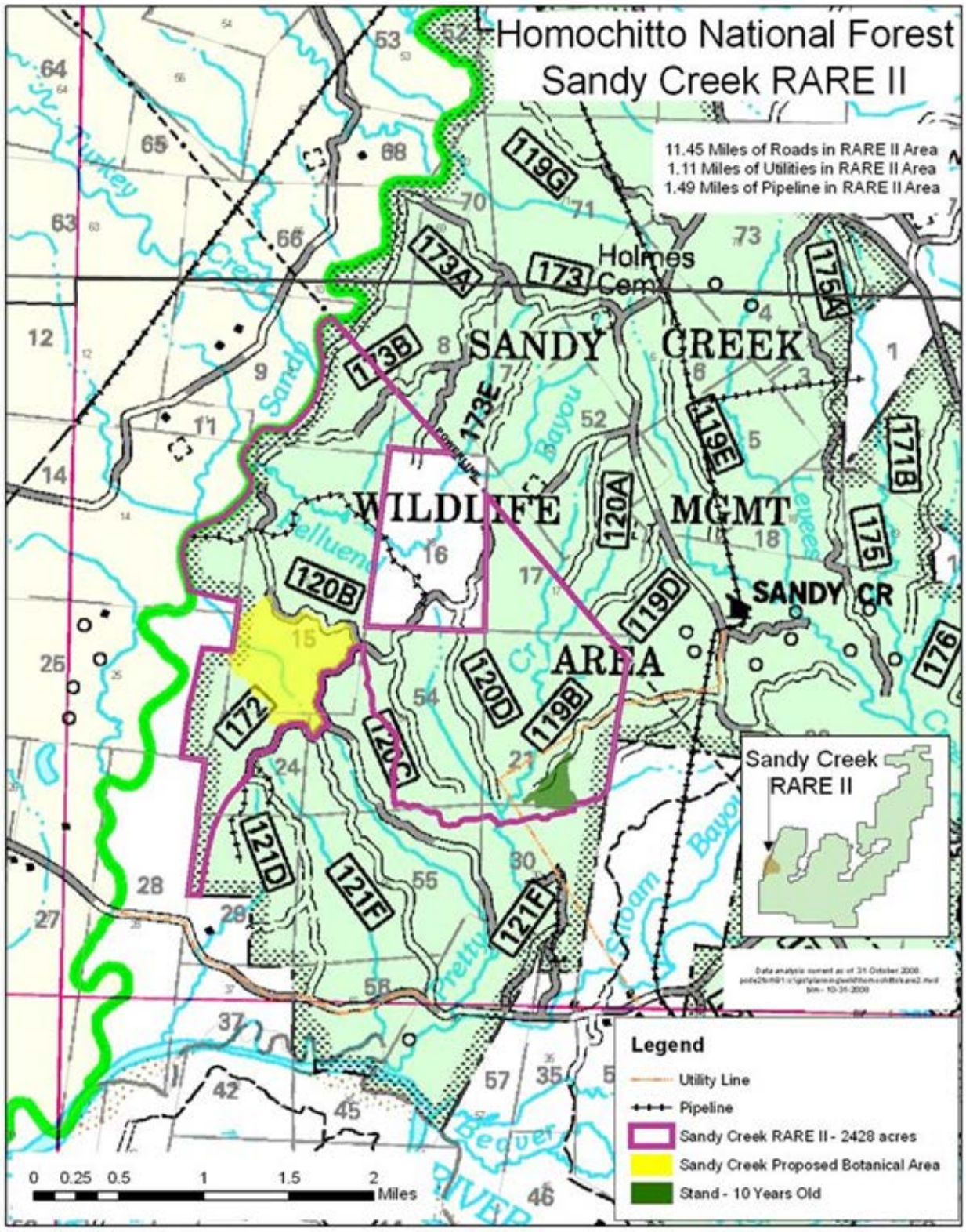

Homochitto National Forest
Sandy Creek RARE II
11.45 Miles of Roads in RARE II Area
1.11 Miles of Utilities in RARE II Area
1.49 Miles of Pipeline in RARE II Area
SANDY CREEK
WILDLIFE MGMT
AREA
Holmes Cem
SANDY CR
Sandy Creek RARE II
0 0.25 0.5 1 1.5 2 Miles
Legend
Utility Line
Pipeline
Sandy Creek RARE II - 2428 acres
Sandy Creek Proposed Botanical Area
Stand - 10 Years Old

Figure C 3. Map of Sandy Creek RARE II area

C.5 Analysis of Areas Proposed During Forest Plan Revision

C.5.1 Ten-Mile Bayou and Six-Mile Bayou, Delta National Forest; Hawk's Nest, Homochitto National Forest

During the forest plan revision process, the National Forests in Mississippi received input on behalf of the Sierra Club and the Friends of Mississippi Public Lands. Within the document submitted in June 2004 "Towards a New Management Plan for the National Forests in Mississippi: A Conservation Re-vision", two areas located on the Delta National Forest were proposed for wilderness consideration. A third area, Hawk's Nest on the Tombigbee National Forest, was also mentioned. Each of these three areas was considered using the criteria for potential wilderness outlined in FSH 1909.12, chapter 70. The documentation for each analysis is described in the following attachments. None of the areas were found to qualify for placement on the potential wilderness inventory.

C.5.2 Ten-Mile Bayou and Six-Mile Bayou

Delta National Forest

During the forest plan revision process, two areas located on the Delta National Forest were proposed for wilderness consideration. The proposed Ten-Mile Bayou contained 9,843 acres and the Six-Mile Bayou area encompassed 11,903 acres, constituting a total of 21,746 acres of the 60,955-acre Delta National Forest (see Figure C 4 and Figure C 5). These two proposed wilderness areas were analyzed individually using the criteria in FSH 1909.12, chapter 70.

Ten-Mile Bayou

The analysis of the Ten-Mile Bayou proposal is documented in Table C 2. While several criteria for potential wilderness were met, there are other criteria that conflict with desired conditions for potential wilderness designation. These conflicting criteria from chapter 70 are summarized below:

- Section 71.11.8 – There are 8 developed hunter camps along the perimeter of the proposed area.
- Section 71.11.10 – Two natural gas transmission lines transect the area for a total of 6.1 miles.
- Section 71.11.11 – Significant watershed improvement projects to restore wetland habitat have been implemented and use structures such as pumping stations and levees.
- Section 71.12.1 – The presence of interior roads, the two pipelines, and water control structures do not meet the criteria of "regaining a natural, untrammeled appearance."
- Sections 71.12.2 – Each of the improvements listed in 71.12.1 is actively being managed by humans, and are not muted or disappearing.
- Section 71.12.4 – There are military training flight paths over the proposed area, and water quality is impacted by runoff from adjacent agricultural lands which have a combined impact on potential wilderness experience.
- Section 71.12.5 –There are more than 17.7 miles of Forest Service roads which equates to a road density of 1.8 miles per 1000 acres.
- Section 71.12.8 – The proposed area contains one unoccupied dwelling and a pumping station. There are also many private dwellings and hunter camps surrounding the perimeter of the area.

Six-Mile Bayou

The analysis of the Six-Mile Bayou proposal is documented in Table C 3. The criteria for potential wilderness in chapter 70 that are not met are summarized below:

- Section 71.11.8 – Recreation improvements include 19 developed hunter camps, both within the interior and along the perimeter of the proposed area. There are two trailhead parking areas, one of which has restroom facilities.
- Section 71.11.10 – There are 3.1 miles of electric power lines within the proposed area.
- Section 71.11.11 – Significant watershed improvement projects are present in the area. There is a high financial investment in these water control structures that provide for 2,519 acres of wetland and waterfowl habitat.
- Section 71.12.1 – The proposed area shows evidence of being "trammeled" by man.
- Section 71.12.2 – Improvements in the area are maintained and managed by the Forest Service and are not muted or disappearing.
- Section 71.12.4 – There are military training flight paths over the proposed area, and water quality is impacted by runoff from adjacent agricultural lands which have a combined impact on potential wilderness experience.
- Section 71.12.5 –There are more than 15 miles of Forest Service roads which equates to a road density of 1.3 miles per 1000 acres.
- Section 71.12.8 – The proposed area contains one dwelling on the private in-holding, and there are many private dwellings and hunt camps surrounding the perimeter of the area.

Other Forest Service observations and issues that apply to both the proposed Ten-Mile Bayou and Six-Mile Bayou wilderness areas include the following:

> Wilderness experiences such as solitude, serenity, adventure and self-reliance would only be attainable after major restoration of interior roads and costly relocation of the natural gas pipelines and electric transmission lines.
>
> The road and trail system currently in place provides only moderate challenge for users because routes are very well defined. Decommissioning and restoring trails and roads would be needed to increase the challenge and adventure.
>
> Recreational use and opportunities are centered on wildlife-associated activities such as fishing, hunting, and wildlife-watching. Forest users are comprised mostly of hunters and/or anglers (approximately 95 percent). Recreation use is high during the fall, winter, and spring when hunting seasons and weather conditions support outdoor activities.
>
> The entire Delta National Forest is also a state wildlife management area (Sunflower WMA). Wildlife habitat improvements include timber management, waterfowl management and wildlife opening management. Located in the Mississippi flyway, Delta National Forest provides critical wintering habitat for migrating waterfowl.
>
> Significant investments (millions of dollars) have been made by the Forest Service and numerous partners to improve and enhance waterfowl habitat on Delta National Forest within both proposed areas.
>
> A wilderness designation would severely impact the way current forest users are accessing and using the forest. The national forest already provides the experience one expects from a wilderness due to the nature of the ecosystem. A wilderness designation would not provide any additional opportunities that are not currently available.
>
> The Louisiana black bear is a federally threatened and state endangered species. Habitat for black bears on Delta National Forest is excellent, and the habitat diversity provided by forest

management activities only increases the quality of this habitat. A wilderness designation would not appear to enhance the chances for successful black bear restoration in the area.

In summary, the two proposed areas, Ten-Mile Bayou and Six-Mile Bayou, currently have high interest and use for recreation, including hunting, fishing, trail use and primitive camping. Many criteria for wilderness designation are not met for each area, as documented in this analysis. The public is served well by continuing with existing uses. After reviewing the criteria for potential wilderness outlined in FSH 1909.12, chapter 70, neither the Ten-Mile Bayou area nor the Six-Mile Bayou area, meet the statutory definition of wilderness and therefore do not qualify for placement in the potential wilderness inventory.

C.6 Analysis of Proposed Wilderness Areas

C.6.1 Delta National Forest

Two areas on the Delta NF were proposed by the Sierra Club and Friends of Mississippi Public Lands document “Towards a New Management Plan for the National Forests in Mississippi: A Conservation Revision” (revised June 2004) as comment to the National Forests in Mississippi forest plan revision process.

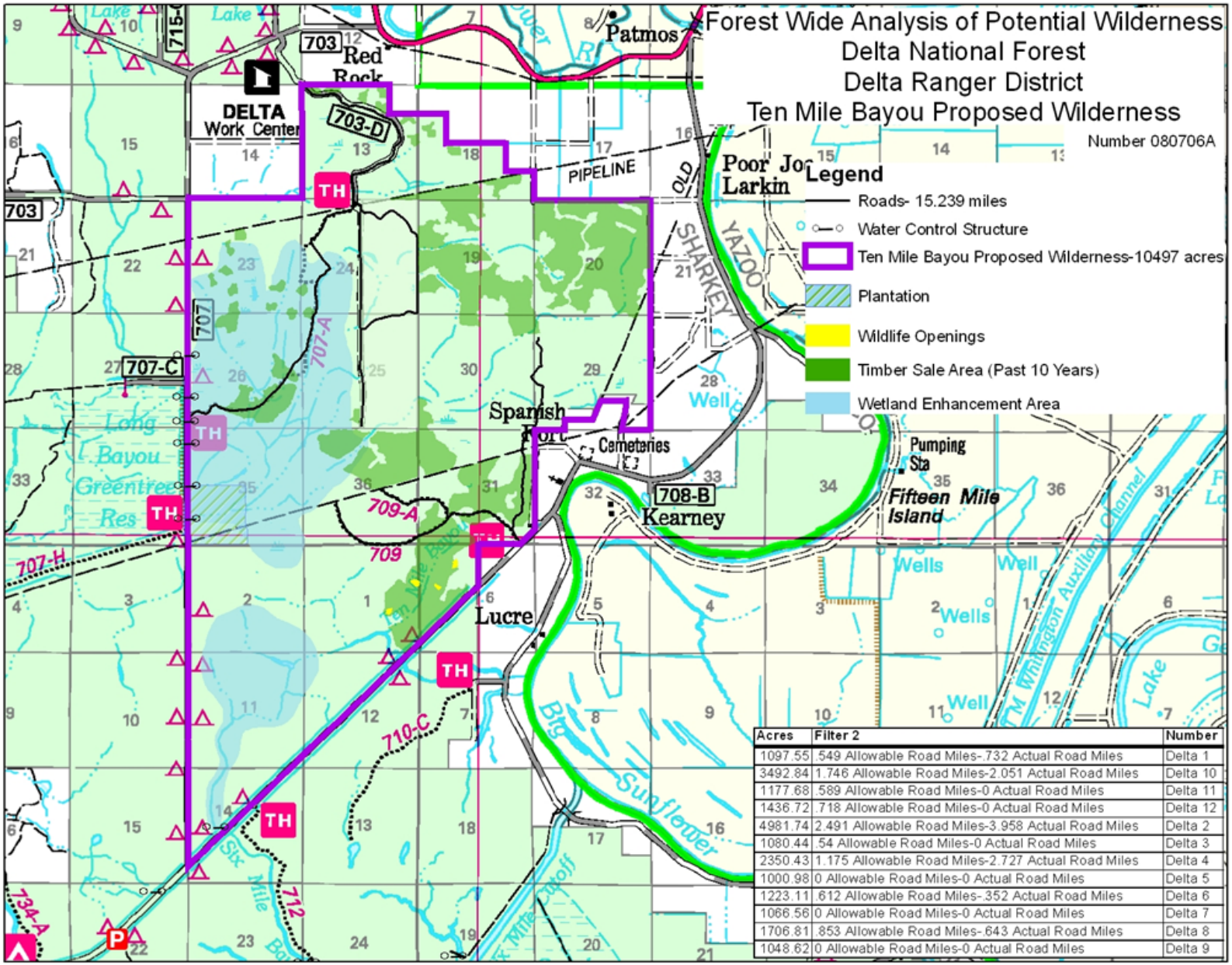
The following tables (Table C 2 and Table C 3), for each area, provides an analysis of how well the proposed areas meet the criteria (FSH 1909.12, chapter 70) for inclusion in the inventory of potential wilderness areas.

Table C 2. Ten Mile Bayou

Directive	Criteria	Comments	Determination
71.1 – Inventory Criteria	**Potential wilderness areas qualify for placement on the inventory of potential wilderness if they meet one or more of the following:**		
	1. They contain 5000 acres or more.	Proposed area contains 9,843 acres	Proposed area meets acreage criterion.
	2. They contain less than 5,000 acres but:		
	a. Due to physical terrain, natural conditions can be preserved	N/A	N/A
	b. They are self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System.	N/A	
	c. They are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size.	N/A	
	3. The area does not contain forest roads (36 CFR 212.1) or other permanently authorized roads, except as permitted in areas east of the 100th meridian (FSH 1909.12, sec. 71.12)	See section 71.12, criterion #5, later within this table	See section 71.12, criterion #5
71.11 - Criteria for including improvements	**Potential wilderness areas may qualify for the inventory even though they include the following types or areas or features.**		
	1. Airstrips and heliports.	None within area.	No impacts.
	2. Cultural treatments involving plantations or plantings where the use of mechanical equipment is not evident.	None within area.	No impacts.
	3. Electronic installations, such as cell towers, television, radio, and telephone repeaters, and the like, provided their impact is minimal.	None within area.	No impacts.
	4. Areas with evidence of historic mining (50+ years ago). Inventoried lands that may have potential for wilderness recommendation may include:		
	a. Areas that otherwise meet inventory criteria if they are covered by mineral leases having a “no surface occupancy” stipulation.	No leases within area.	No impacts.
	b. Areas covered by mineral leases that otherwise meet inventory criteria only if the lessee has not exercised development and occupancy rights. If and when these rights are exercised, remove the area, or portion affected, from the inventory unless it is possible to establish specific occupancy provisions that would maintain the area in a condition suitable for wilderness.	No leases within area.	No impacts.
	5. National Grasslands and Prairies. National Grasslands and Prairies may have structures or evidence of vegetative manipulation resulting from past management practices. National Grassland and Prairie lands that contain the following features may be inventoried:		
	a. Vegetation type conversions that are reverting to native vegetation with minimal evidence of cultivation.	N/A	N/A
	b. Less than 1 mile of interior fence per section	N/A	N/A

Directive	Criteria	Comments	Determination
71.11 - Criteria for including improvements (cont'd)	6. Areas of less than 70-percent Federal ownership, if it is realistic to manage the Federal lands as wilderness, independent of the private land.	Area has more than 70% Federal ownership.	This criterion is met.
	7. Minor structural range improvements (FSM 2240.5) such as fences or water troughs. Exclude areas where nonstructural range improvements are readily visible and apparent. Areas with spray or burning projects are permissible if there is little or no evidence of the project.	There are no range improvements within the proposed area.	Potential wilderness criteria are not impacted by range improvements.
	8. Recreation improvements such as occupancy spots or minor hunting or outfitter camps. As a general rule, do not include developed sites. Areas with minor, easily removable recreation developments may be included.	Area includes 8 developed hunter camps (#35, #37, #41, #42A, #43, #45, #66, #68, #69) located along FR 707 and the Dummy Line Rd (county).	Developed hunter camps are present in the proposed area, this criterion is not met.
	9. Timber harvest areas where logging and prior road construction are not evident, except as provided in Section 71.12 for areas east of the 100th meridian.	See section 71.12, criterion #7, later within this table	See section 71.12, criterion #7.
	10. Ground-return telephone lines, electric lines and power lines, if a right-of-way has not been cleared.	Two natural gas transmission lines operated by Southern Natural and Texas Eastern transect the area for a total of 6.1 miles or 33 ROW acres.	Utility right-of-ways are present in the area; this criterion is not met.
	11. Watershed treatment areas if the use of mechanical equipment is not evident. The inventory may include areas where minor watershed treatment has been accomplished manually, such as small hand-constructed gully plugs.	Three partnership projects have been constructed within the area to improve wetland habitat for over-wintering waterfowl and other wetland species. A total of 3500 ac. of wetland habitat has been restored as a result of these projects.	Significant watershed improvement projects are present in the area and are maintained and managed by the FS. There is high financial investment in these areas; this criterion is not met.

Directive	Criteria	Comments	Determination
71.12 - Criteria for Potential Wilderness Areas East of the 100th Meridian	**National Forest System lands in the Eastern United States (east of the 100th meridian) have been acquired over time from private ownership. Criteria for inventorying those lands that may have potential for wilderness recommendation recognize that much, if not all of the land, shows some signs of human activity and modification even though they have shown high recuperative capabilities. Areas east of the 100th meridian qualify for inventory as lands that may have potential for wilderness recommendation if:**		
	1. The land is regaining a natural, untrammeled appearance.	Area has a history of forest management. Old logging roads traverse the area. Water-control structures are managed for wetland species including wintering waterfowl. The public has a history of using the area for hunting.	The proposed area show evidence of being "trammeled" by man.
	2. Improvements existing in the area are being affected by the forces of nature rather than humans and are disappearing or muted.	Improvements in the area consist of the following: FS roads (level 3), FS road (level 2), water control structures, trailheads, parking areas, SST, numerous administrative use trails, and two gas pipelines	Proposed area does not meet this criterion. All sites are being maintained by the Forest Service.
	3. The area has existing or attainable NFS ownership patterns, both surface and subsurface, that could ensure perpetuation of identified wilderness characteristics.	The area is contiguous in NFS ownership. Adjacent to the area on the NW corner lies another 640 acres of private ownership which has been subdivided into private hunt camps along FR 703.	Proposed area meets the ownership pattern criteria.
	4. The location of the area is conducive to perpetuation of wilderness values. Consider the relationship of the area to sources of noise, air and water pollutions, as well as the unsightly conditions that would have an effect on the wilderness experience. The amount and pattern of Federal ownership is also a factor.	There are military training flight paths over the area. Water quality is impacted by runoff from adjacent agricultural lands. There is also a Green Tree Reservoir pumping station in the area.	It would be difficult to attain or perpetuate wilderness values or experience in this area.
	5. The area contains no more than a half mile of improved road for each 1,000 acres, and the road is under Forest Service jurisdiction.	FS roads within the area are FR 707 and FR 703D (7 mi., level 3). Additional improved, motorized roads/trails are FR 707A, FR 709, FR 709A, and FR 709B (7.72 mi., level 2). County maintained Dummyline Rd borders on the south.	This criterion is not met, there are 17.72 miles of road for 9,843 acres which equates to a road density of approx. 1.8 miles per 1000 acres.
	6. No more than 15 percent of the area is in non-native, planted vegetation.	The area contains native vegetation.	Proposed area meets non-planted vegetation criteria.
	7. Twenty percent or less of the area has been harvested within the past 10 years.	Within the last 10 years forest management activities have been implemented on 1,889 acres within the area. Historical logging routes and old trails as well as more recent logging routes are evident throughout the area.	Proposed area meets the percent harvested criterion.
	8. The area contains only a few dwellings on private lands and the location of these dwellings and their access needs insulate their effects on wilderness characteristics on NFS lands.	Proposed area contains one dwelling and one pumping station. Many private dwellings and hunter camps surround the area.	Proposed area is heavily impacted by adjacent private land on the north and east side of the proposed area.



Acres	Filter 2	Number
1097.55	.549 Allowable Road Miles-.732 Actual Road Miles	Delta 1
3492.84	1.746 Allowable Road Miles-2.051 Actual Road Miles	Delta 10
1177.68	.589 Allowable Road Miles-0 Actual Road Miles	Delta 11
1436.72	.718 Allowable Road Miles-0 Actual Road Miles	Delta 12
4981.74	2.491 Allowable Road Miles-3.958 Actual Road Miles	Delta 2
1080.44	.54 Allowable Road Miles-0 Actual Road Miles	Delta 3
2350.43	1.175 Allowable Road Miles-2.727 Actual Road Miles	Delta 4
1000.98	0 Allowable Road Miles-0 Actual Road Miles	Delta 5
1223.11	.612 Allowable Road Miles-.352 Actual Road Miles	Delta 6
1066.56	0 Allowable Road Miles-0 Actual Road Miles	Delta 7
1706.81	.853 Allowable Road Miles-.643 Actual Road Miles	Delta 8
1048.62	0 Allowable Road Miles-0 Actual Road Miles	Delta 9

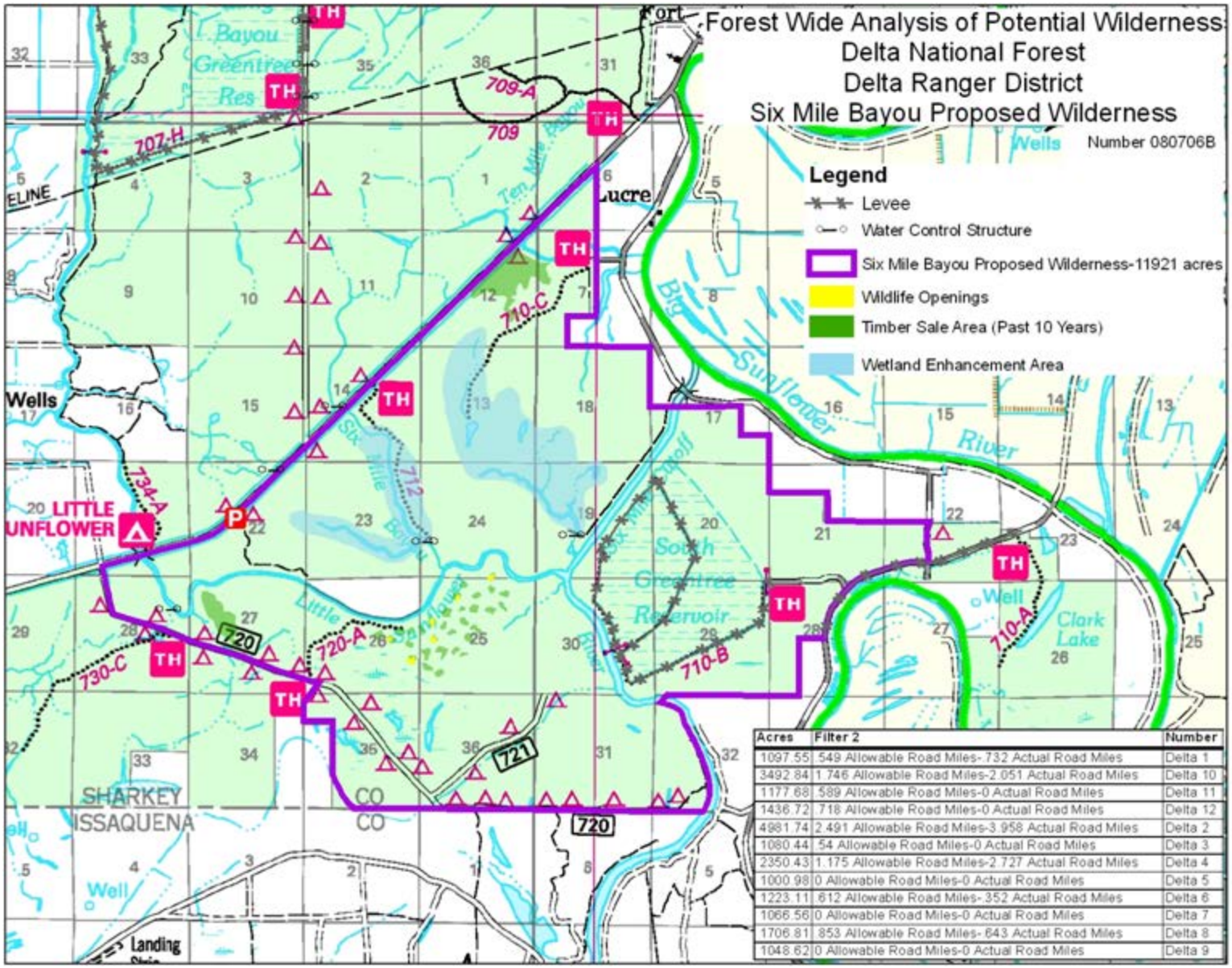
Figure C 4. Map of Ten Mile Bayou

Table C 3. Six Mile Bayou

Directive	Criteria	Comments	Determination
71.1 – Inventory Criteria	**Potential wilderness areas qualify for placement on the inventory of potential wilderness if they meet one or more of the following:**		
	1. They contain 5000 acres or more.	Proposed area contains 11,903 acres	Proposed area meets acreage criterion.
	2. They contain less than 5,000 acres but:		
	a. Due to physical terrain, natural conditions can be preserved	N/A	N/A
	b. They are self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System.	N/A	N/A
	c. They are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size.	N/A	N/A
	3. The area does not contain forest roads (36 CFR 212.1) or other permanently authorized roads, except as permitted in areas east of the 100th meridian (FSH 1909.12, sec. 71.12)	See section 71.12, criterion #5, later within this table	See section 71.12, criterion #5
71.11 - Criteria for including improvements	**Potential wilderness areas may qualify for the inventory even though they include the following types or areas or features.**		
	1. Airstrips and heliports.	None within area.	None within area.
	2. Cultural treatments involving plantations or plantings where the use of mechanical equipment is not evident.	There is one 80 ac. plantation within the area.	Overall impact of less than 1% of area.
	3. Electronic installations, such as cell towers, television, radio, and telephone repeaters, and the like, provided their impact is minimal.	None within area.	None within area.
	4. Areas with evidence of historic mining (50+ years ago). Inventoried lands that may have potential for wilderness recommendation may include:		
	a. Areas that otherwise meet inventory criteria if they are covered by mineral leases having a “no surface occupancy” stipulation.	No mineral Leases within area.	N/A
	b. Areas covered by mineral leases that otherwise meet inventory criteria only if the lessee has not exercised development and occupancy rights. If and when these rights are exercised, remove the area, or portion affected, from the inventory unless it is possible to establish specific occupancy provisions that would maintain the area in a condition suitable for wilderness.	No mineral Leases within area.	N/A
	5. National Grasslands and Prairies. National Grasslands and Prairies may have structures or evidence of vegetative manipulation resulting from past management practices. National Grassland and Prairie lands that contain the following features may be inventoried:		
	a. Vegetation type conversions that are reverting to native vegetation with minimal evidence of cultivation.	N/A	N/A
	b. Less than 1 mile of interior fence per section	N/A	N/A
	6. Areas of less than 70-percent Federal ownership, if it is realistic to manage the Federal lands as wilderness, independent of the private land.	There is more than 70 percent Federal ownership.	This criterion is met

Directive	Criteria	Comments	Determination
71.11 - Criteria for including improvements (cont'd)	7. Minor structural range improvements (FSM 2240.5) such as fences or water troughs. Exclude areas where nonstructural range improvements are readily visible and apparent. Areas with spray or burning projects are permissible if there is little or no evidence of the project.	There are no range improvements within the proposed area.	Potential wilderness criteria are not impacted by range improvements.
	8. Recreation improvements such as occupancy spots or minor hunting or outfitter camps. As a general rule, do not include developed sites. Areas with minor, easily removable recreation developments may be included.	Area includes 19 developed hunter camps located along FR 720, 721 and the Dummy Line Rd (county). A public parking area is also located along Dummy Line Rd. Trailheads for public parking exist at FR 712 and FR 720A. One restroom facility (SST) is located at the FR 720A trailhead.	Developed hunter camps, parking areas and trailheads are present in the proposed area, this criterion is not met.
	9. Timber harvest areas where logging and prior road construction are not evident, except as provided in Section 71.12 for areas east of the 100th meridian.	See section 71.12, criteria #7, later within this table	See section 71.12, criterion #7.
	10. Ground-return telephone lines, electric lines and power lines, if a right-of-way has not been cleared.	Electrical power line runs from the South GTR across the Little Sunflower River, down FR 721 and across FR 720 (3.1 miles).	Utility right-of-ways are present in the area; this criterion is not met.
	11. Watershed treatment areas if the use of mechanical equipment is not evident. The inventory may include areas where minor watershed treatment has been accomplished manually, such as small hand-constructed gully plugs.	The South GTR, Six-Mile, Four-Mile, Howlett Bayou and Rookery Lake water control structures are located within the area and comprise 2,519 acres under wetland and waterfowl management.	Significant watershed improvement projects are present in the area. There is a high financial investment in these improvements that are maintained and managed by the FS.
71.12 - Criteria for Potential Wilderness Areas East of the 100th Meridian	**National Forest System lands in the Eastern United States (east of the 100th meridian) have been acquired over time from private ownership. Criteria for inventorying those lands that may have potential for wilderness recommendation recognize that much, if not all of the land, shows some signs of human activity and modification even though they have shown high recuperative capabilities. Areas east of the 100th meridian qualify for inventory as lands that may have potential for wilderness recommendation if:**		
	1. The land is regaining a natural, untrammeled appearance. "trammel - a restriction on free activity or movement"	Area has a history of forest management. Old logging roads traverse the area. Water-control structures are managed for wetland species including wintering waterfowl. The public has a history of using the area for hunting.	The proposed area show evidence of being "trammeled" by man.

Directive	Criteria	Comments	Determination
71.12 - Criteria for Potential Wilderness Areas East of the 100th Meridian (cont'd)	2. Improvements existing in the area are being affected by the forces of nature rather than humans and are disappearing or muted.	Improvements in the area consist of the following: FS roads (level 3), FS road (level 2), water control structures, greentree reservoir, trail-heads, parking areas, sst restroom, private property and electric power lines.	Proposed area does not meet this criterion. All sites are being maintained by the Forest Service.
	3. The area has existing or attainable NFS ownership patterns, both surface and subsurface, that could ensure perpetuation of identified wilderness characteristics.	The area is contiguous in NFS ownership with the exception of the Champion Camp (166 acres) located centrally within the area.	Proposed area meets the ownership pattern criterion.
	4. The location of the area is conducive to perpetuation of wilderness values. Consider the relationship of the area to sources of noise, air and water pollutions, as well as the unsightly conditions that would have an effect on the wilderness experience. The amount and pattern of Federal ownership is also a factor.	There is military flight training routes over the area. Water runoff from adjacent agricultural fields flows through this area to the Little Sunflower River.	It would be difficult to attain or perpetuate wilderness values or experience in this area.
	5. The area contains no more than a half mile of improved road for each 1,000 acres, and the road is under Forest Service jurisdiction.	The area contains 15 miles of Level 3 Forest Service roads.	This criterion is not met, the road density is approximately 1.3 miles per 1000 acres.
	6. No more than 15 percent of the area is in non-native, planted vegetation.	The area contains native vegetation.	Proposed area meets non-planted vegetation criterion.
	7. Twenty percent or less of the area has been harvested within the past 10 years.	Approximately 2 percent (218 acres) has been harvested in the past 10 years.	Proposed area meets the percent harvested criterion.
	8. The area contains only a few dwellings on private lands and the location of these dwellings and their access needs insulate their effects on wilderness characteristics on NFS lands.	Proposed area contains one private dwelling located on the Champion property. Many private dwellings, hunt camps and agricultural fields surround the area.	Proposed area is impacted by private land within the area and surrounding boundary of the area.



Acres	Filter 2	Number
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1223.11	.612 Allowable Road Miles-.352 Actual Road Miles	Delta 6
1066.56	0 Allowable Road Miles-0 Actual Road Miles	Delta 7
1706.81	.853 Allowable Road Miles-.643 Actual Road Miles	Delta 8
1048.62	0 Allowable Road Miles-0 Actual Road Miles	Delta 9

Figure C 5. Map of Six Mile Bayou

C.7 Hawk's Nest Area

C.7.1 Tombigbee National Forest

The Friends of Mississippi Public Lands and Sierra Club submitted a document titled, "Towards a New Management Plan for the National Forests in Mississippi: A Conservation Re-vision" (revised June 2004) as comment to the National Forests in Mississippi forest plan revision process proposing the Hawk's Nest area in the Tombigbee for consideration as a potential wilderness area.

Their proposal was considered using criteria established in FSH 1909.12, chapter 70. The analysis of the Hawk's Nest proposal is documented in the attached table. While several criteria for potential wilderness were met, there are other criteria that conflict with desired conditions for potential wilderness. These conflicting criteria are summarized below:

- Section 71.12.1 – With 12.34 miles of interior Forest Service roads, 2.7 miles of electric transmission lines, and 24 miles of maintained mountain bike trails, the proposed area is not "regaining a natural, untrammeled appearance."
- Section 71.12.2 – Each of the improvements listed in 71.12.1 is actively being managed by humans, not nature, and is not muted or disappearing.
- Section 71.12.3 – Although some in-holdings may be available for purchase, one landowner of 105 acres would probably not be willing to sell, and the Little Rock cemetery would also not be available for purchase.
- Section 71.12.4 – With close proximity to State Highway 15 and the communities of Ackerman and Louisville, the Hawk's Nest area is not remote. Noise from traffic on Highway 15 can be heard at times. Pine plantations on large tracts of private in-holdings negatively impact potential wilderness character.
- Section 71.12.5 – There are more than 12 miles of interior Forest Service roads.

Other Forest Service observations and issues regarding the Hawk's Nest area include the following:

- Wilderness experiences such as solitude, serenity, adventure and self-reliance would only be attainable after major restoration of 12.34 miles of interior roads and relocation of 2.7 miles of a major (100-foot wide) Tennessee Valley Authority (TVA) electric transmission line. A relocation of the TVA transmission line would be very costly and would likely be opposed.
- The extensive road and trail system currently in place provides only moderate challenge as routes are very defined. Decommissioning and restoring trails and roads would be needed to increase the challenge and adventure.
- Outdoor recreation opportunities are currently provided in the project area; however, wilderness use would shift the types of use due to reduced access. Mountain bike trails would have to convert to hiking or equestrian trails, and designated primitive campsites would be decommissioned. Access by vehicle for nature study, hunting or wildlife viewing would be sacrificed.
- Special Features are limited with the exception of the proposed Choctaw #4 Botanical area, a 45-acre stand of pristine old-growth hardwood which will be protected whether the proposed area is wilderness or not.
- The proposed wilderness lies entirely in the Choctaw Wildlife Management Area, a cooperative special use with the Mississippi Department of Wildlife, Fisheries and Parks (MDWFP). It is unknown how MDWFP or the public would receive a proposal for wilderness designation.

In summary, the proposed area currently has high interest and use for recreation, including hunting, fishing, trail use and primitive camping. Many criteria for wilderness designation are not met as

documented in this analysis. The public is served well by continuing with existing uses. After reviewing the criteria for potential wilderness outlined in FSH 1909.12, chapter 70, the Hawk's Nest area does not meet the statutory definition of wilderness and therefore do not qualify for placement in the inventory of potential wilderness.

C.8 Analysis of Proposed Wilderness Areas

C.8.1 Tombigbee National Forest

Hawk's Nest

The Hawk's Nest area on the Homochitto NF was mentioned in the Sierra Club and Friends of Mississippi Public Lands document "Towards a New Management Plan for the National Forests in Mississippi: A Conservation Re-vision" (revised June 2004) as comment to the National Forests in Mississippi forest plan revision process. Table C 4 provides an analysis of how well the Hawk's Nest area meets the criteria (FSH 1909.12, chapter 70) for inclusion in the forest inventory of potential wilderness areas.

Table C 4. Hawk's Nest

Directive	Criteria	Comments	Determination
71.1 – Inventory Criteria	**Potential wilderness areas qualify for placement on the inventory of potential wilderness if they meet one or more of the following**:		
	1. They contain 5000 acres or more.	The proposed area includes 4431 FS acres and 766 private acres, for a total of 5197 acres.	Obtaining 5000 acres will require acquiring some of the private in-holdings. For this reason we address each of the less than 5000 acres criteria below.
	2. They contain less than 5,000 acres but:		
	a. Due to physical terrain, natural conditions can be preserved	The proposed area is bounded by roads on the north and south flanks and by property lines on the east and west flanks.	This criterion is not met, the area is defined by roads and private boundary, not physical terrain.
	b. They are self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System.	The proposed area is not a self-contained ecosystem.	This criterion is not met.
	c. They are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size.	The proposed area is not contiguous to existing wilderness, primitive areas or potential wilderness.	This criterion is not met.
	3. The area does not contain forest roads (36 CFR 212.1) or other permanently authorized roads, except as permitted in areas east of the 100th meridian (FSH 1909.12, sec. 71.12)	See section 71.12, criterion #5, later within this table	See section 71.12, criterion #5
71.11 - Criteria for including improvements	**Potential wilderness areas may qualify for the inventory even though they include the following types or areas or features.**		
	1. Airstrips and heliports.	There are no airstrips or heliports.	This criterion is met.
	2. Cultural treatments involving plantations or plantings where the use of mechanical equipment is not evident.	Most of the private in-holdings and adjacent private lands are managed in young pine plantations.	This criterion is not met.
	3. Electronic installations, such as cell towers, television, radio, and telephone repeaters, and the like, provided their impact is minimal.	There are no electronic or communication improvements	This criterion is met.
	4. Areas with evidence of historic mining (50+ years ago). Inventoried lands that may have potential for wilderness recommendation may include:		
	a. Areas that otherwise meet inventory criteria if they are covered by mineral leases having a “no surface occupancy” stipulation.	The Choctaw #4 Proposed Botanical Area has a No Surface Occupancy stipulation; the rest of the area is leased but allows for Surface Occupancy.	Most of the area allows for surface occupancy, this criterion is not met.
	b. Areas covered by mineral leases that otherwise meet inventory criteria only if the lessee has not exercised development and occupancy rights. If and when these rights are exercised, remove the area, or portion affected, from the inventory unless it is possible to establish specific occupancy provisions that would maintain the area in a condition suitable for wilderness.	There are several mineral leases (FS minerals and surface) which would expire in 2013-2015; no active mineral activity within the proposed area.	Lease holders have the right to develop their leases until the lease date expires. Until then surface occupancy is allowed.

Directive	Criteria	Comments	Determination
71.11 - Criteria for including improvements (cont'd)	5. National Grasslands and Prairies. National Grasslands and Prairies may have structures or evidence of vegetative manipulation resulting from past management practices. National Grassland and Prairie lands that contain the following features may be inventoried:		
	a. Vegetation type conversions that are reverting to native vegetation with minimal evidence of cultivation.	N/A	N/A
	b. Less than 1 mile of interior fence per section	N/A	N/A
	6. Areas of less than 70-percent Federal ownership, if it is realistic to manage the Federal lands as wilderness, independent of the private land.	There are approx. 4431 Federal acres per 5197 total, this equates to 87% Federal ownership. Some of the private landowners might be receptive to selling their land. If private lands are not acquired it may be difficult to manage the Federal lands as wilderness, independent of the private land.	The percent Federal ownership is met, however there is some doubt to whether the total area could be managed as wilderness without acquiring at least the landlocked in-holdings in Sections 19 and 29 of Township 16 North, Range 12 East, approx. 480 acres.
	7. Minor structural range improvements (FSM 2240.5) such as fences or water troughs. Exclude areas where nonstructural range improvements are readily visible and apparent. Areas with spray or burning projects are permissible if there is little or no evidence of the project.	There are no range improvements.	No range improvements are impacting the wilderness character.
	8. Recreation improvements such as occupancy spots or minor hunting or outfitter camps. As a general rule, do not include developed sites. Areas with minor, easily removable recreation developments may be included.	There are 24 miles of developed mountain bike trails within the proposed area.	The mountain bike trails are well established. This Criterion is not met.
	9. Timber harvest areas where logging and prior road construction are not evident, except as provided in Section 71.12 for areas east of the 100th meridian.	See section 71.12, criterion #7, later within this table	See section 71.12, criterion #7.
	10. Ground-return telephone lines, electric lines and power lines, if a right-of-way has not been cleared.	There are 2.7 miles of cleared electric transmission lines within the proposed area.	This criterion is not met.
	11. Watershed treatment areas if the use of mechanical equipment is not evident. The inventory may include areas where minor watershed treatment has been accomplished manually, such as small hand-constructed gully plugs.	There are no watershed treatment areas within the proposed area.	No watershed treatment areas impact the wilderness character.
71.12 - Criteria for Potential Wilderness Areas East of the 100th Meridian	**National Forest System lands in the Eastern United States (east of the 100th meridian) have been acquired over time from private ownership. Criteria for inventorying those lands that may have potential for wilderness recommendation recognize that much, if not all of the land, shows some signs of human activity and modification even though they have shown high recuperative capabilities. Areas east of the 100th meridian qualify for inventory as lands that may have potential for wilderness recommendation if:**		
	1. The land is regaining a natural, untrammeled appearance. "trammel - a restriction on free activity or movement"	There is 12.34 miles of interior forest roads, 2.7 miles of electric transmission lines and 24 miles of FS mountain bike trails.	This criterion is not met.

Directive	Criteria	Comments	Determination
71.12 - Criteria for Potential Wilderness Areas East of the 100th Meridian (cont'd)	2. Improvements existing in the area are being affected by the forces of nature rather than humans and are disappearing or muted.	FS Roads, the electric transmission lines and FS trails are all being maintained at present. Inclusive FS lands are currently managed for multiple use including timber mgt.	This criterion is not presently met.
	3. The area has existing or attainable NFS ownership patterns, both surface and subsurface, that could ensure perpetuation of identified wilderness characteristics.	There are private in-holdings totaling 660 acres. 501 of these acres are in private timber company ownership and could likely be acquired. Tract 821 has half interest in all minerals outstanding in third party (46 ac.). There are several mineral leases (FS minerals and surface) which would expire in 2013-2015. The Noxubee Hill Cemetery is a 2.8 acre in-holding in the southern portion of proposed area.	There is a good possibility that private timber company in-holdings could be acquired. Two landowners of 159 acres in the southeast may be receptive to selling. The 2.8 acre Noxubee Hill Cemetery in-holding would not be available for purchase. The landowner for the 105 acre in-holding in the north part of the proposed area would probably not be receptive to selling. Mineral interests, including leases could possibly be purchased.
	4. The location of the area is conducive to perpetuation of wilderness values. Consider the relationship of the area to sources of noise, air and water pollutions, as well as the unsightly conditions that would have an effect on the wilderness experience. The amount and pattern of Federal ownership is also a factor.	The proposed area is within 2-3 miles of state hwy. 15 between Ackerman and Louisville, MS. The area is within 5 miles of either community. The 320 ac. block of pvt. land in Sec. 19, T16N, R12 E and the pvt. In-holding in Sec 29 is in young pine plantations. There is other managed pvt. land adjoining the area on the east and west.	Some traffic along Highway 15 would likely be heard at times. Agriculture from adjoining private land on the east and west might impact water quality. The timber company land in the center of the proposed area does not have wilderness character.
	5. The area contains no more than a half mile of improved road for each 1,000 acres, and the road is under Forest Service jurisdiction.	There are 12.34 miles of interior FS roads within the proposed area, which equates to 2.6 miles of road per 100 acres.	This criterion is not met for road density.
	6. No more than 15 percent of the area is in non-native, planted vegetation.	No non-native planted vegetation is in the proposed area.	This criterion is met.
	7. Twenty percent or less of the area has been harvested within the past 10 years.	There are no FS stands less than 10 years old. The private timberlands are however less than 10 years old, if acquired this would comprise only about 10% of the total area.	This criterion is met.
	8. The area contains only a few dwellings on private lands and the location of these dwellings and their access needs insulate their effects on wilderness characteristics on NFS lands.	There are no dwellings on interior private lands	This criterion is met.

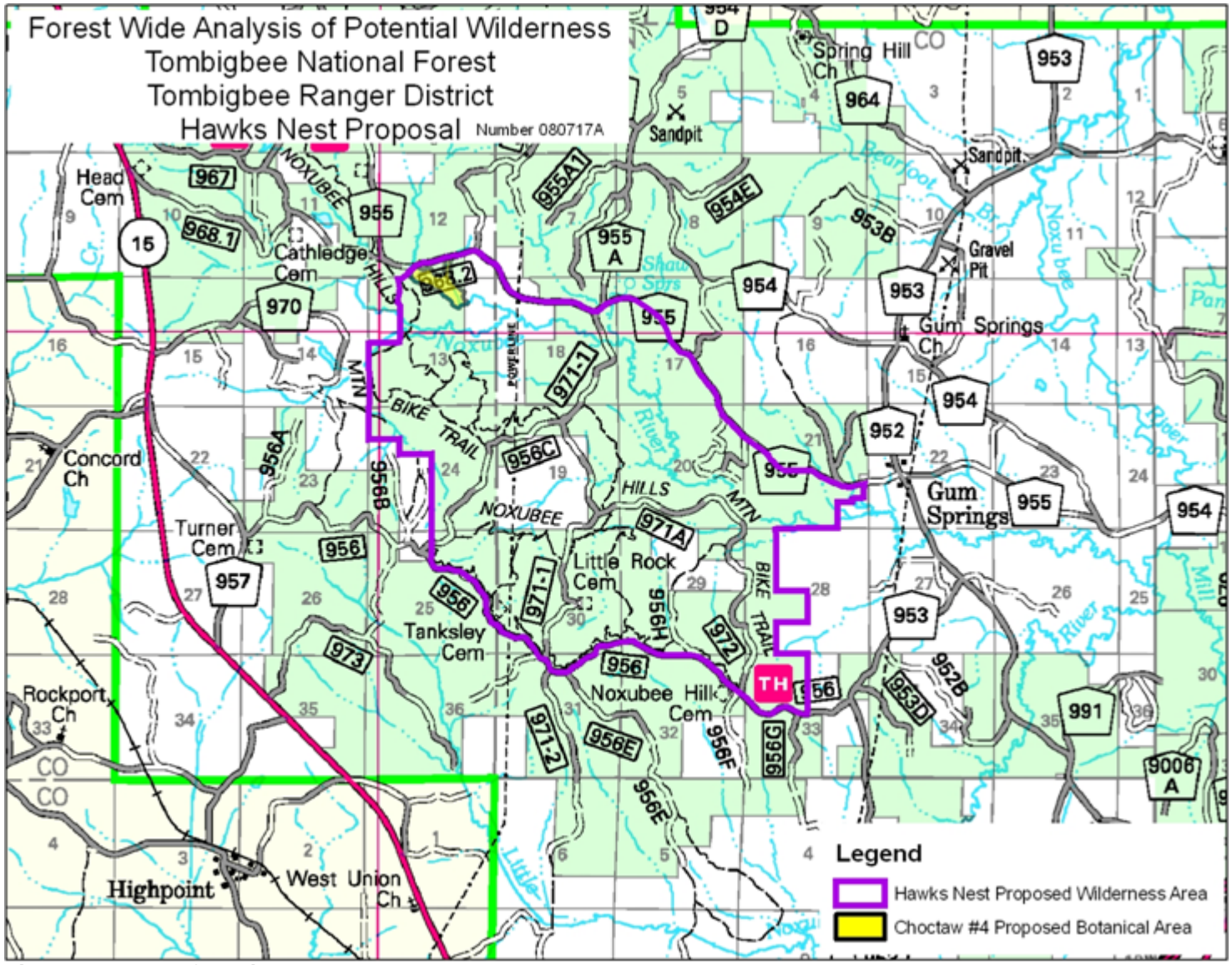


Figure C 6. Map of Hawk's Nest

C.9 GIS-based Forestwide Analysis of Potential Wilderness Areas

A forest–wide analysis of all large blocks of NFS administered lands was completed using the following methodology from FSH 1909.12, chapter 70:

- A GIS query identified NFS blocks of ownership of 1,000 acres or more.
- Each identified tracts was evaluated to sort out tracts with a road density of one-half mile or less roads per 1,000 acres.
- Each block which passed the first two criteria above was evaluated to ensure that no more than 20 percent of the area had been harvested in the past 10 years.
- Finally, each remaining block of potential wilderness was analyzed individually for consideration of manageability, remoteness, ability to provide solitude, unique characteristics, and other improvements (mineral development, power lines, pipelines, etc.)

Each of the areas that went through the above filtering process is documented below by ranger district. Maps are provided using district administrative map format to give the best sense of geographic placement relative to surrounding communities, proximity to roads (forest, county, state, etc.), local landmarks and encumbrances such as utility right-of-ways. It should be noted that the GIS layer for district administrative maps do not always coincide with actual GIS roads layer. The GIS roads layer is the more accurate layer and was used as the base for the road density analysis.

C.9.1 Bienville National Forest

Bienville 1 – this 1583-acre tract has a large 332-acre private in-holding with access and a second 8.5-acre tract of private land without access. There is a 1.5-mile utility line corridor that cuts diagonally through the west half of the area. Considering these encumbrances, the relatively small size of the tract, and the lack of any special features or potential for wilderness experience, this area does not meet the criteria for potential wilderness.

Bienville 2 – is a long and narrow 1136-acre tract bounded by private property lines and roads with no other special features. This area would not provide wilderness experience or challenge and would be difficult to manage. This area does not meet the criteria for potential wilderness.

Bienville 3 – is a 1297-acre tract surrounded by roads on the east, west, and south perimeter and by landlines on the north perimeter. The area is less than a mile and a half north of State Highway 80 near Shockaloe Horse Trail, Base Camp 1. There would be little challenge or sense of remoteness within this area, and there are no unique or special features. For these reasons, including the small size of the area, Bienville 3 will not be included in the inventory of potential wilderness.

Bienville 4 – is a 1140-acre tract mostly surrounded by roads. It is located just west of Shockaloe Horse Trail and 2-1/2 miles north of US Highway 80. Much like Bienville 3 above, there is little opportunity for wilderness solitude or remoteness, and there are no unique features. As such, this area does not meet the criteria for inclusion in the inventory of potential wilderness.

Bienville 5 – this 1105-acre tract is completely surrounded by roads. There is a 0.9-mile linear ROW cutting diagonally through the northern third of the area. Due to its small size and lack of wilderness character, values, or uniqueness, this area does not meet the criteria for inclusion in the inventory of potential wilderness.

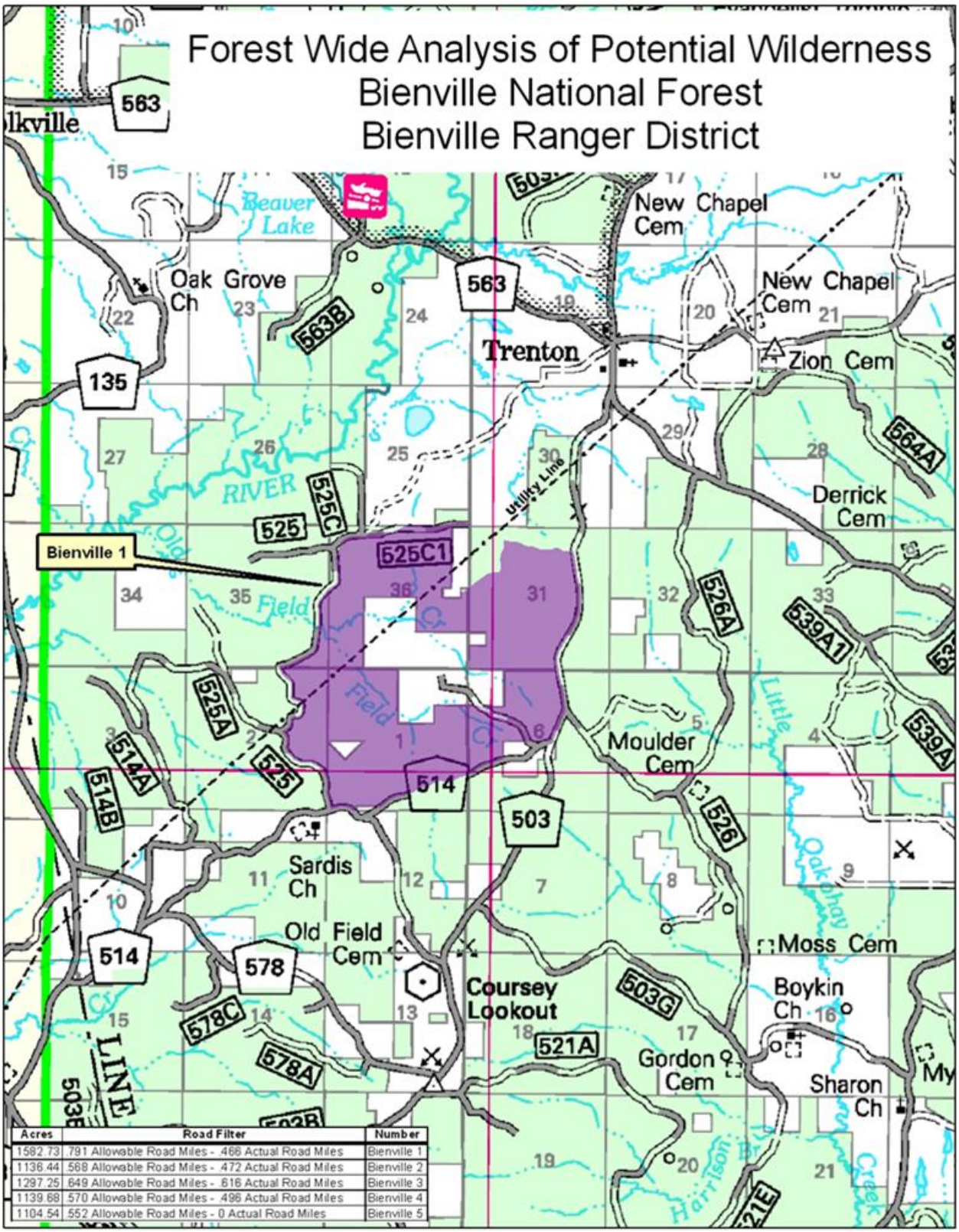


Figure C 7. Map of Bienville area 1

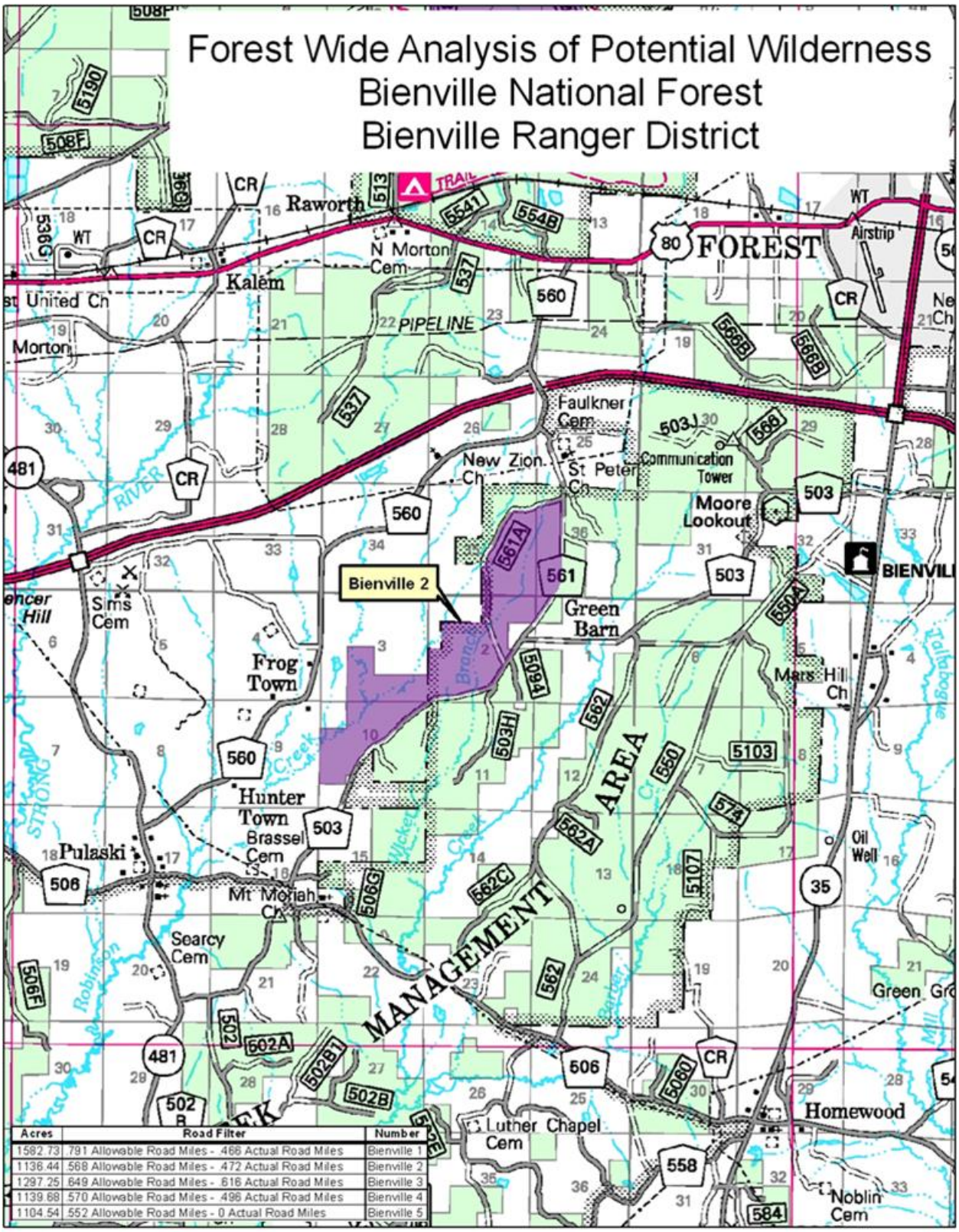


Figure C 8. Map of Bienville area 2

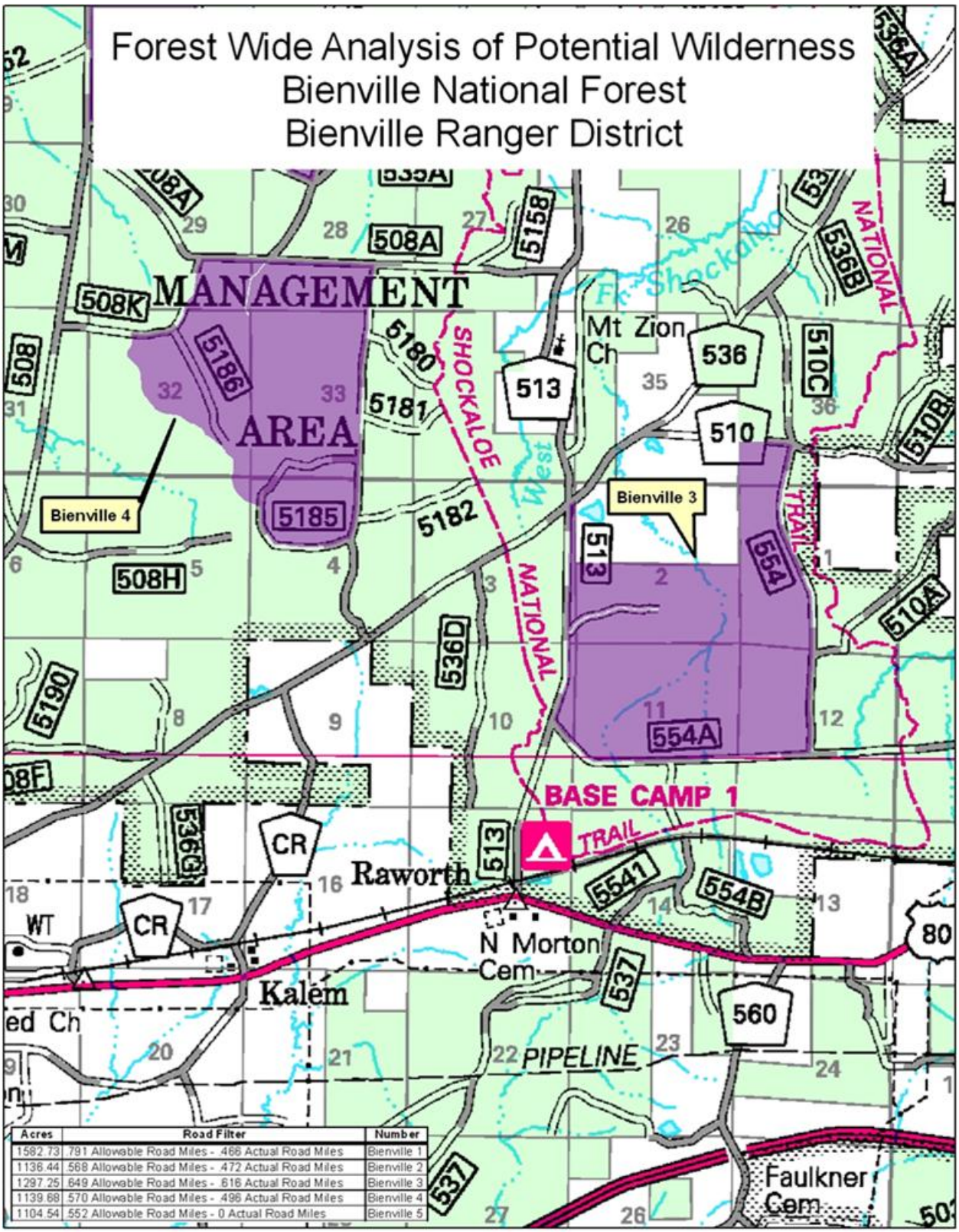


Figure C 9. Map of Bienville areas 3 and 4

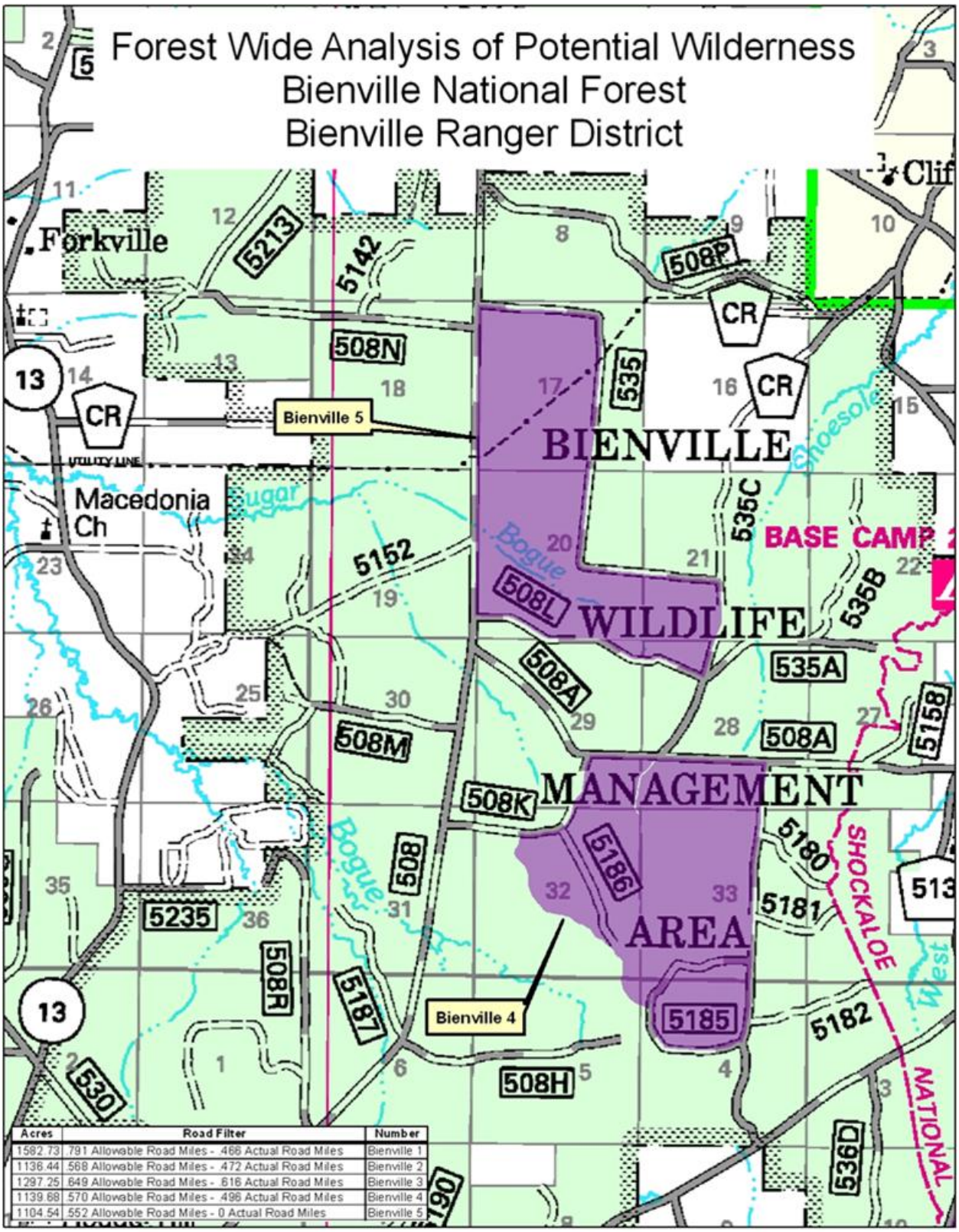


Figure C 10. Map of Bienville areas 4 and 5

C.9.2 Delta National Forest

Delta 1- is 1133 acres in size and located south of Little Sunflower Recreation Area. It is bounded by roads and private land. There are 2 developed hunter camps along Forest Road 720 and a trailhead parking area. Consideration was given to take in all of the NFS land south of 720 to see if this would improve the road density; but it did not, and it would have involved adding additional hunt camps and a second trailhead into the proposed area. Other nearby improvements includes a small aircraft landing strip one mile west of the area and a second landing strip 2-1/1 miles south of the area. Given the area's small size, lack of remoteness and no unique features, it does not meet the criteria for potential wilderness.

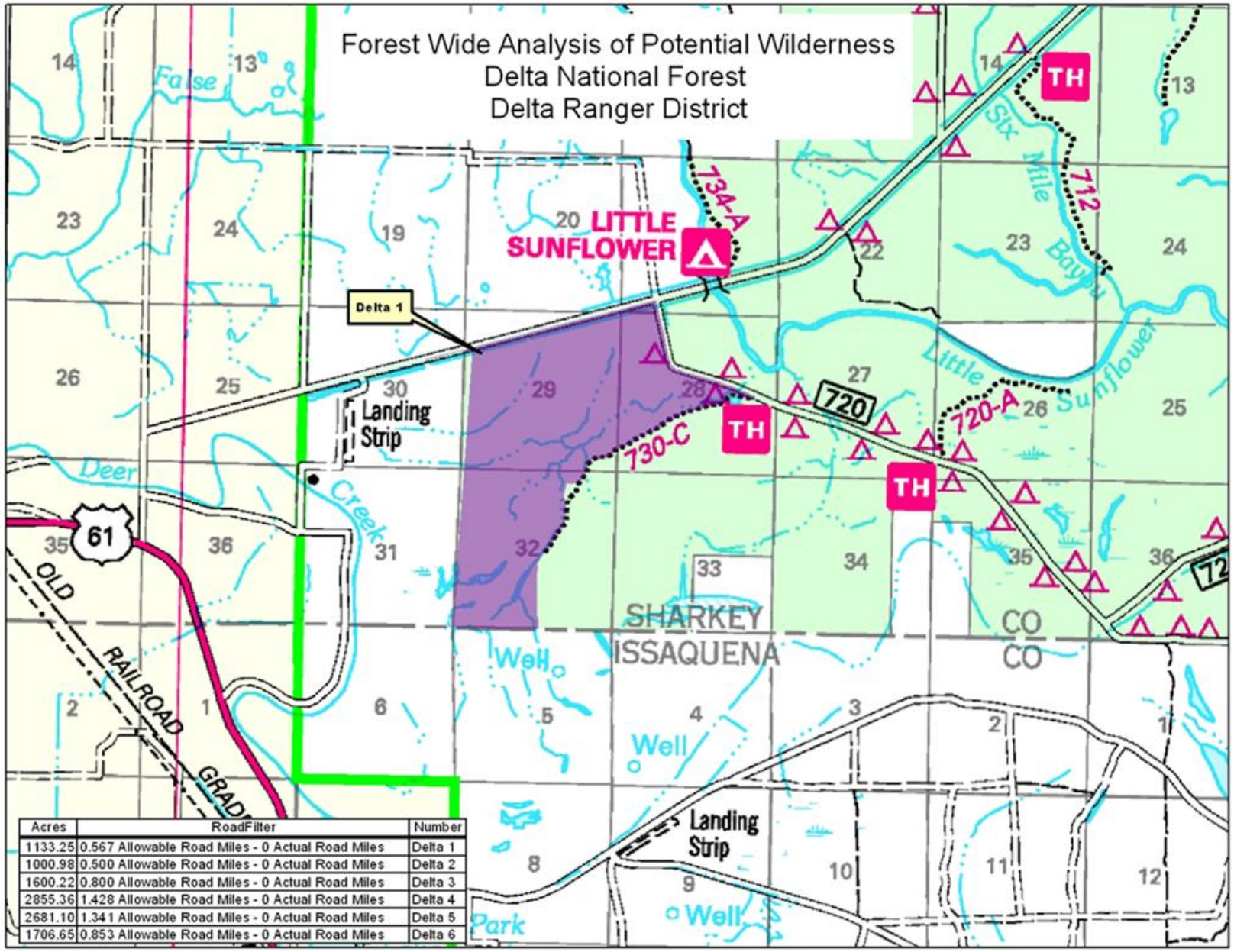
Delta 2 – is 1001 acres in size, located in an oxbow of the Big Sunflower River, and bounded by other private lands. Although there are numerous sloughs within the area, with this area's small size and lack of any unique features or wilderness values, it does not does not meet the criteria for inclusion in the inventory of potential wilderness.

Delta 3 – is located just east and south of the Delta Work Center. It is 1600 acres in size and is bounded by roads and private property. A pipeline crosses the area for a mile and a half, and there is one developed trailhead. Due to the pipeline and the lack of unique or special features, Delta 3 does not meet the criteria for potential wilderness.

Delta 4 – this 2855-acre tract lies between Forest Road 715 and the Little Sunflower River. It is generally a mile across by four miles long. Six developed hunter camps are located along the boundary roads, and the Delta Work Center is a half mile east of the area. Other encumbrances include a one and one-half mile pipeline. Delta 4 does not meet the criteria for potential wilderness due to the pipeline, developed recreation, lack of remoteness, and lack of unique or special features.

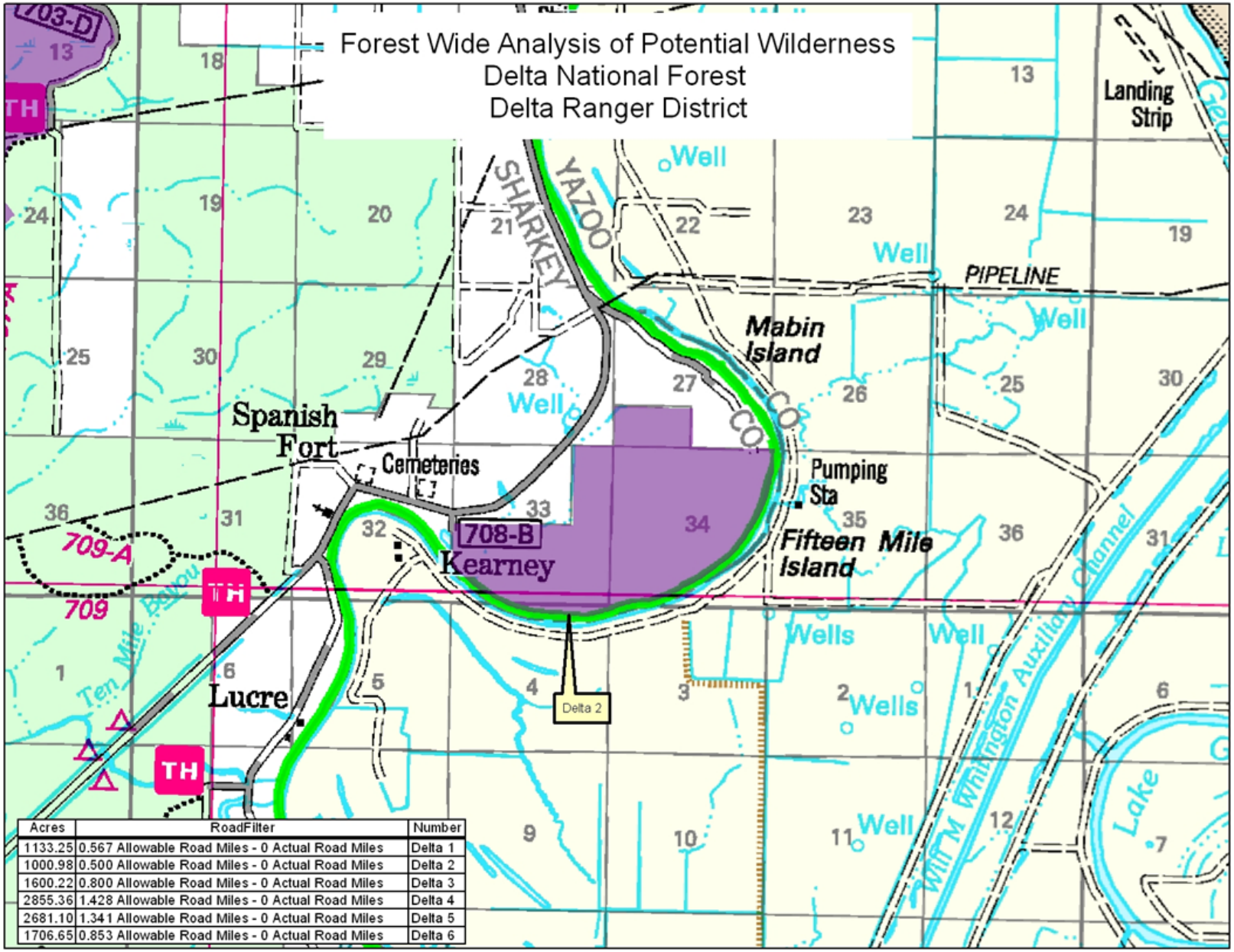
Delta 5 - is 2681 acres in size and located approximately one and a half miles from State Highway 16. The tract is primarily bounded by roads and private property. As this area is surrounded by roads and close to a busy state highway, it is not remote and there are no unique features to otherwise warrant consideration as potential wilderness. This area does not meet the criteria for inclusion in the inventory of potential wilderness.

Delta 6 – is located on the opposite side of FS 706-C from Delta 5. This 1707-acre tract also has no unique features, there is one developed trailhead, and the area lacks remoteness due to its narrowness (no more than a mile across) and its general location. This area does not meet the criteria for potential wilderness.



Acres	RoadFilter	Number
1133.25	0.567 Allowable Road Miles - 0 Actual Road Miles	Delta 1
1000.98	0.500 Allowable Road Miles - 0 Actual Road Miles	Delta 2
1600.22	0.800 Allowable Road Miles - 0 Actual Road Miles	Delta 3
2855.36	1.428 Allowable Road Miles - 0 Actual Road Miles	Delta 4
2681.10	1.341 Allowable Road Miles - 0 Actual Road Miles	Delta 5
1706.65	0.853 Allowable Road Miles - 0 Actual Road Miles	Delta 6

Figure C 11. Map of Delta area 1



Acres	RoadFilter	Number
1133.25	0.567 Allowable Road Miles - 0 Actual Road Miles	Delta 1
1000.98	0.500 Allowable Road Miles - 0 Actual Road Miles	Delta 2
1600.22	0.800 Allowable Road Miles - 0 Actual Road Miles	Delta 3
2855.36	1.428 Allowable Road Miles - 0 Actual Road Miles	Delta 4
2681.10	1.341 Allowable Road Miles - 0 Actual Road Miles	Delta 5
1706.65	0.853 Allowable Road Miles - 0 Actual Road Miles	Delta 6

Figure C 12. Map of Delta area 2

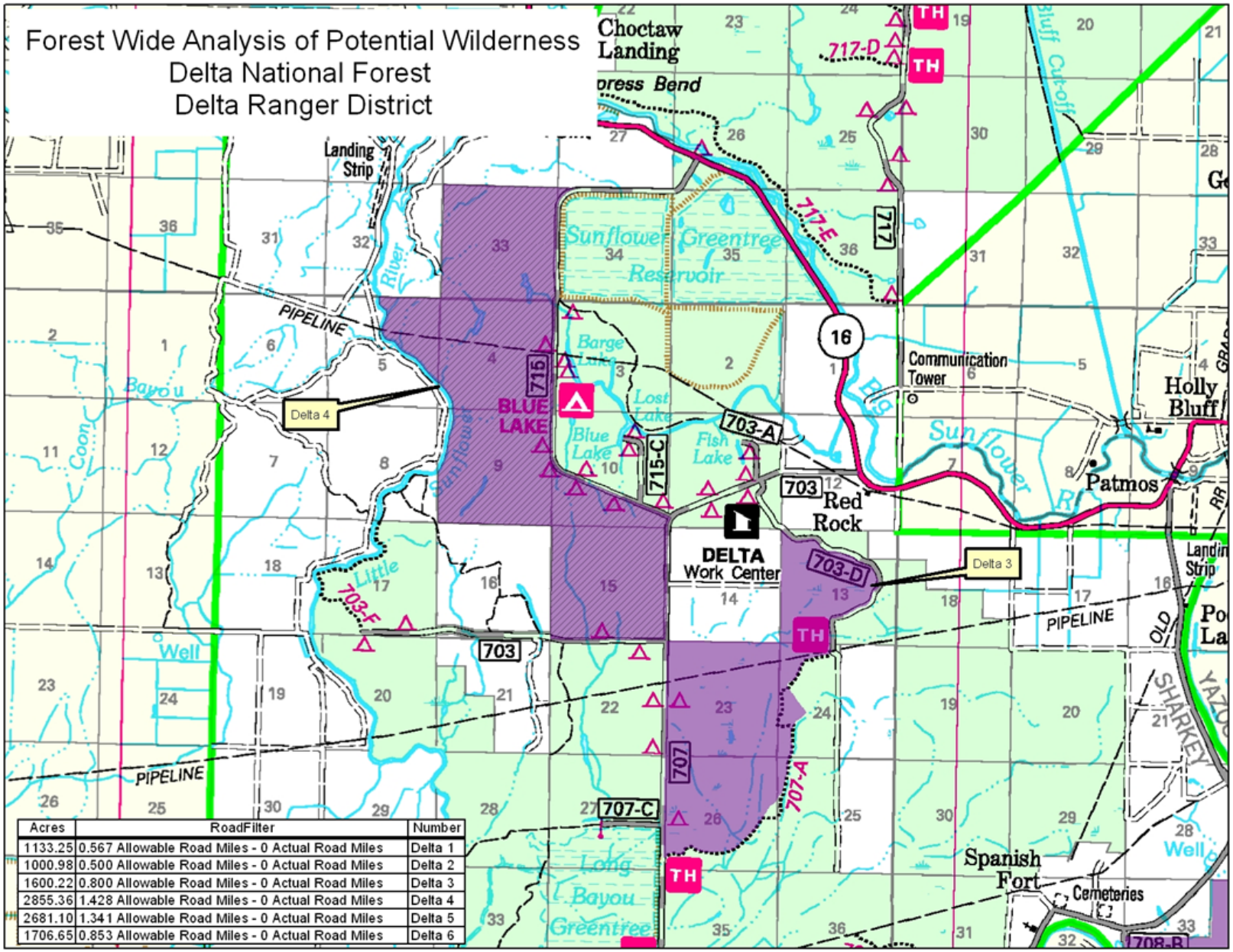
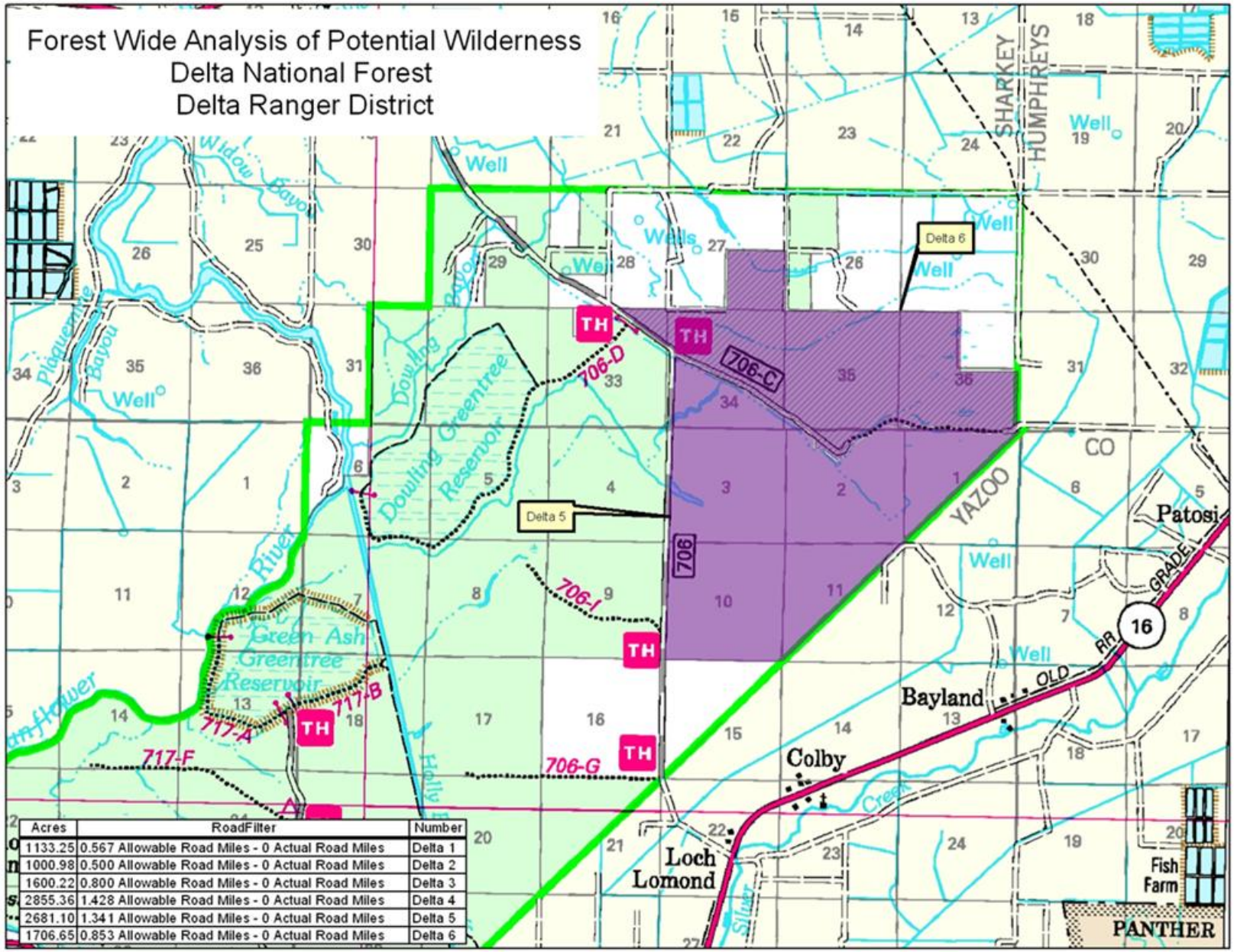


Figure C 13. Map of Delta areas 3 and 4



Acres	RoadFilter	Number
1133.25	0.567 Allowable Road Miles - 0 Actual Road Miles	Delta 1
1000.98	0.500 Allowable Road Miles - 0 Actual Road Miles	Delta 2
1600.22	0.800 Allowable Road Miles - 0 Actual Road Miles	Delta 3
2855.36	1.428 Allowable Road Miles - 0 Actual Road Miles	Delta 4
2681.10	1.341 Allowable Road Miles - 0 Actual Road Miles	Delta 5
1706.65	0.853 Allowable Road Miles - 0 Actual Road Miles	Delta 6

Figure C 14. Map of Delta areas 5 and 6

C.9.3 De Soto National Forest, De Soto Ranger District

Areas within the De Soto Ranger District on the De Soto National Forest that lie within the Camp Shelby Military Special Use Area were excluded from consideration due to active use of the area for military training and maneuvers. Camp Shelby is a training area for U.S. military forces awaiting deployment. Tank maneuver areas, areas with unexploded ordinance, and other training sites were not available or suitable for wilderness consideration.

De Soto 1 – is a 1444-acre tract surrounded by roads and private landlines. State Highway 15 borders the west side of the area. There are two private in-holdings totaling approximately 300 acres. The area is located just south of Bethel Motorcycle Trail. This area does not meet the criteria for potential wilderness.

De Soto 2 – this 1540-acre tract is bounded by Red Creek Road to the south, Forest Road 349 to the north and east, and private landlines on the west. A pipeline crosses the western portion for a mile and a half. There is little opportunity to experience solitude and wilderness challenge and there are no unique or special features. This area does not meet the criteria for inclusion in the inventory of potential wilderness.

C.9.4 De Soto National Forest, Chickasawhay Ranger District

The GIS analysis of the Chickasawhay Ranger District on the De Soto National Forest did not yield any areas with less than a half mile of road per 1000 acres. Therefore, no areas were identified as eligible for inclusion in the inventory of potential wilderness.

C.9.5 Holly Springs National Forest

Holly Springs 1 – is a 112-acre tract bounded by roads on three sides and private landlines on the north flank. Although there are no interior Forest Service roads, there are old woods roads along two ridges. There are no special or unique features to this area, and it would be difficult to experience remoteness or wilderness challenge. As such, this area does not meet the criteria for inclusion in the inventory of potential wilderness.

C.9.6 Homochitto National Forest

The GIS analysis of the Homochitto NF did not yield any areas with less than a half mile of road per 1000 acres. The Sandy Creek RARE II area was evaluated and did not meet the criteria for potential wilderness based on road density, interior power lines, and lack of other wilderness characteristics. No areas on the Homochitto National Forest met the criteria for inclusion in the inventory of potential wilderness.

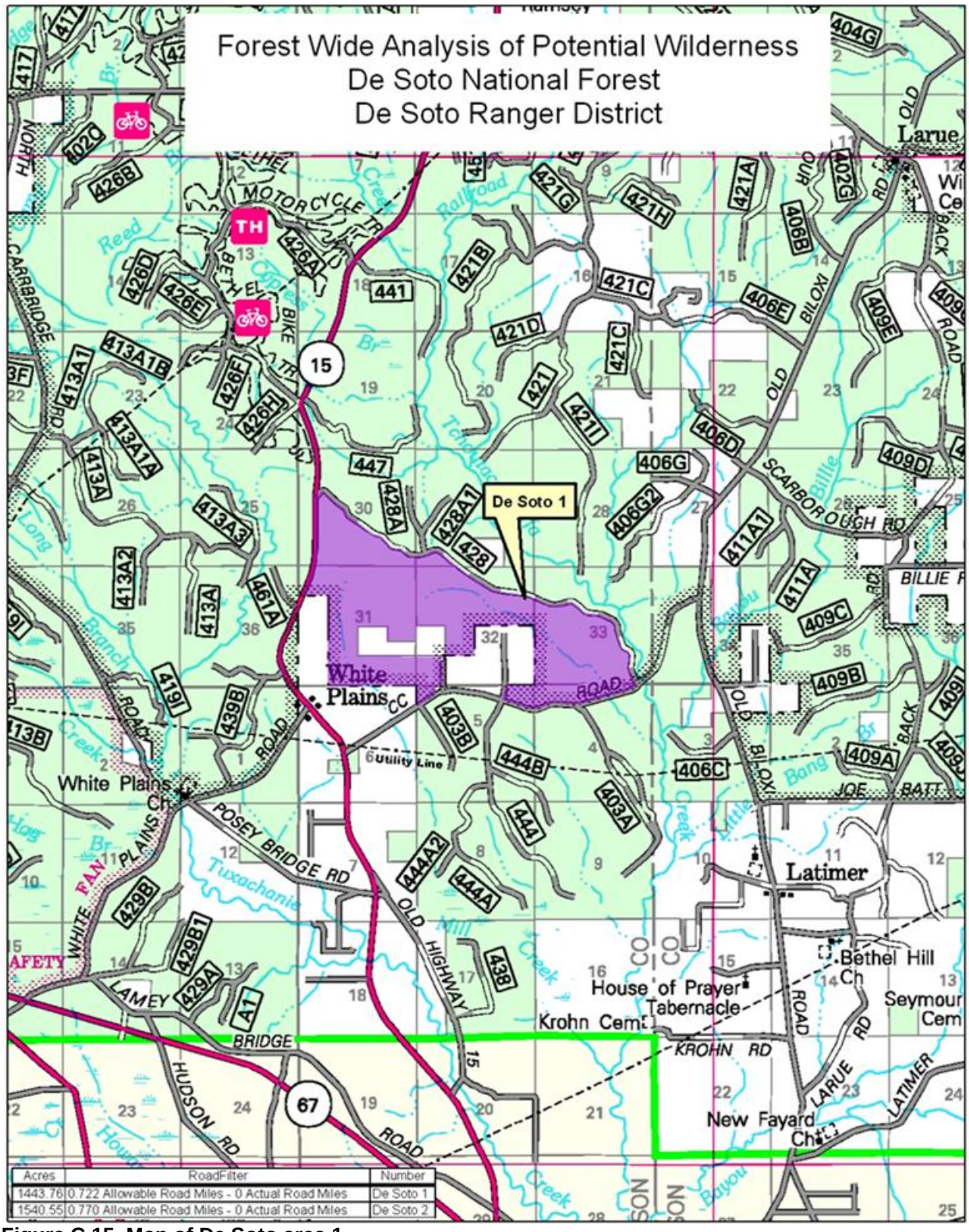


Figure C 15. Map of De Soto area 1

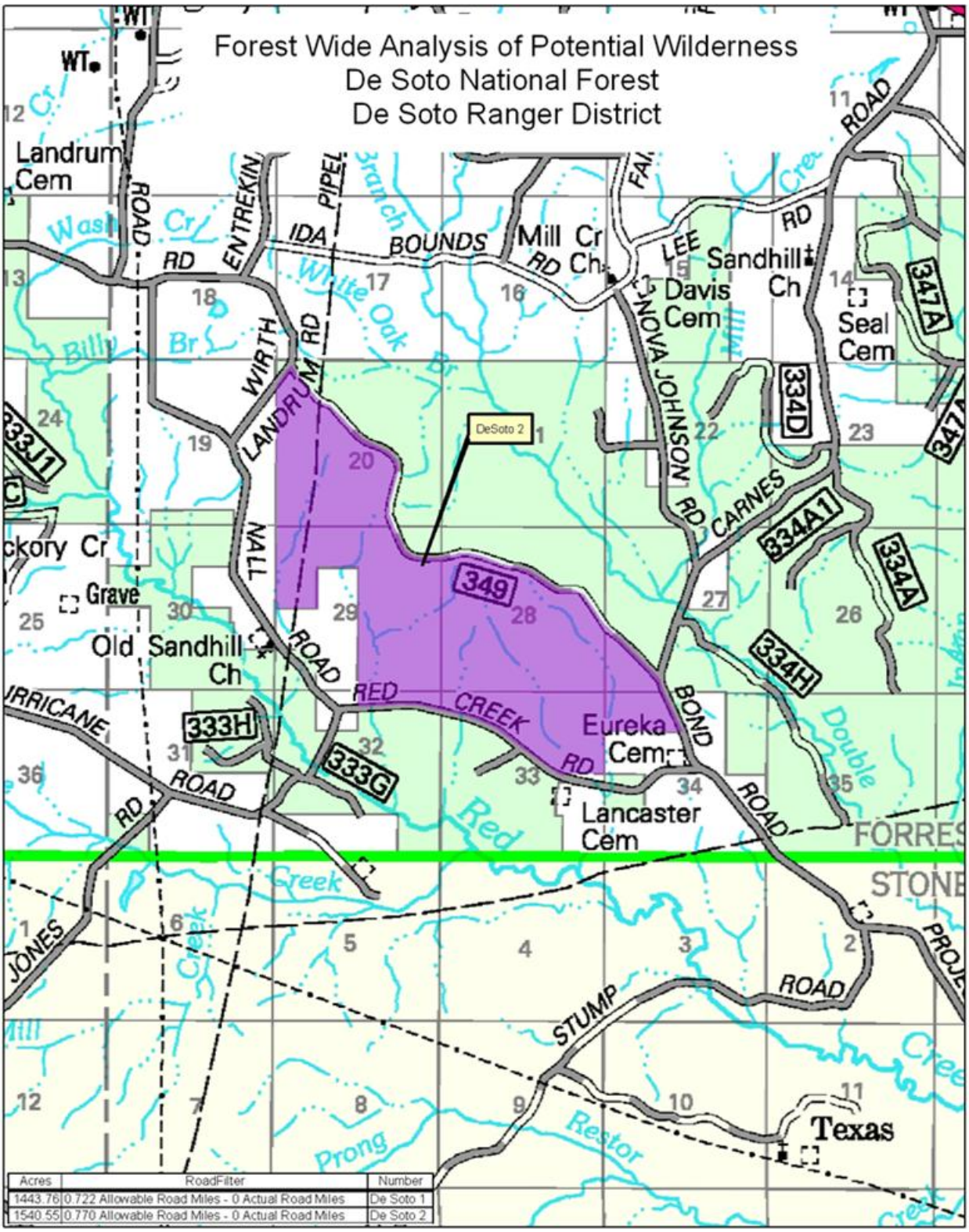

Forest Wide Analysis of Potential Wilderness
De Soto National Forest
De Soto Ranger District
DeSoto 2
Landrum Cem
Old Sandhill Ch
Eureka Cem
Lancaster Cem
Seal Cem
Davis Cem
Sandhill Ch
Texas
Grave
Acres | RoadFilter | Number
1443.76 | 0.722 Allowable Road Miles - 0 Actual Road Miles | De Soto 1
1540.55 | 0.770 Allowable Road Miles - 0 Actual Road Miles | De Soto 2

Figure C 16. Map of De Soto area 2

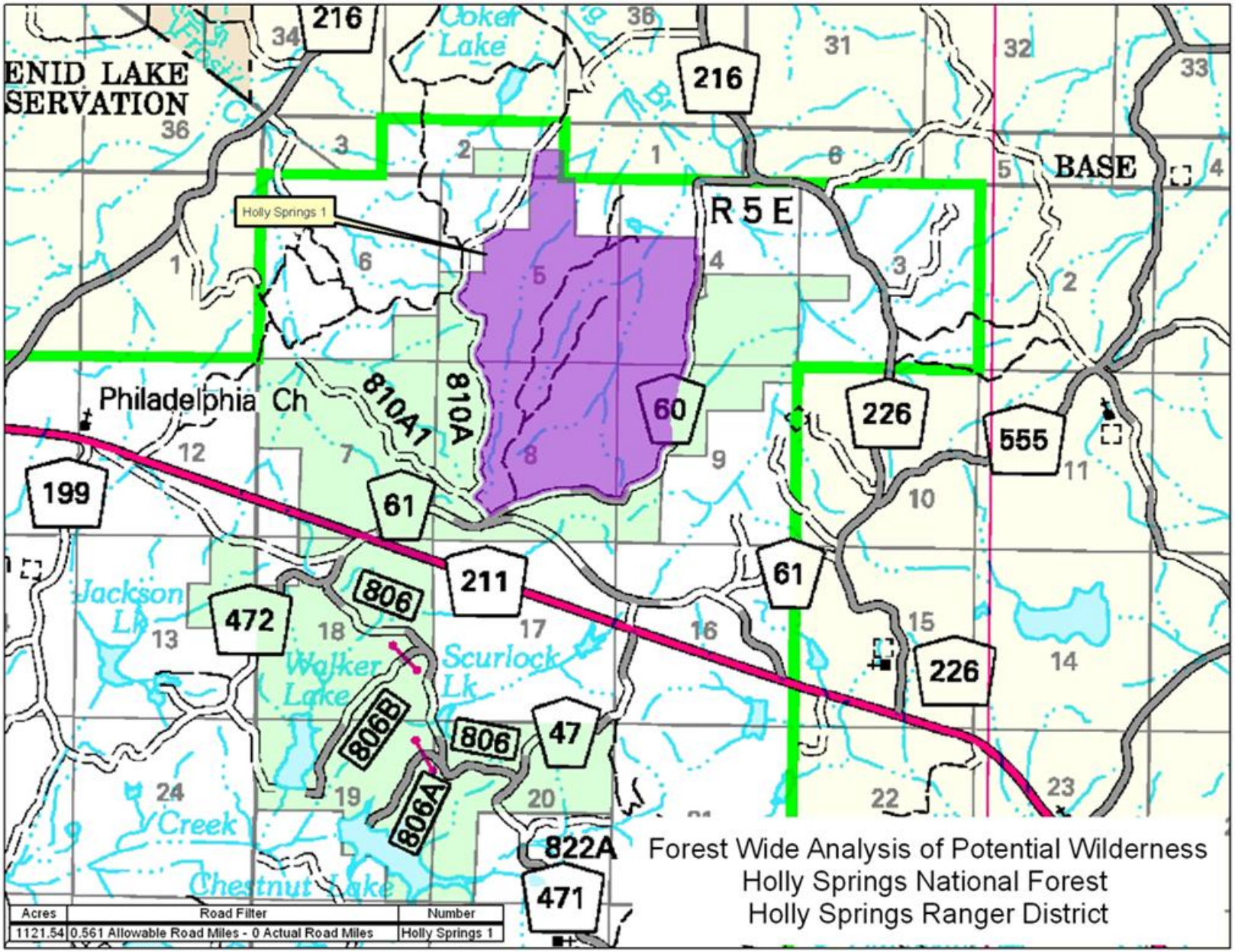


Figure C 17. Map of Holly Springs area 1

C.9.7 Tombigbee National Forest

Tombigbee 1 – The Natchez Trace Parkway borders this 2003-acre tract on its eastern flank and other roads surround the area. There is approximately 1 mile of utility right-of-way and two old sand pits in the southern portion. Seven miles of the Witch Dance Horse Trail meander through the area, with the Witch Dance Trailhead also located adjacent to the area. Although this area has many recreation features, it does not meet the criteria for potential wilderness.

Tombigbee 2 – located adjacent to Tombigbee 1, this 1042-acre tract has private lands adjoining it along two-thirds of its perimeter and the area is less than a mile across in any given point. There are no unique features, and the area would not provide for any wilderness values. This area does not meet the criteria for inclusion in the inventory of potential wilderness.

C.9.8 Summary of District-by-District Analysis for Potential Wilderness Areas

Each ranger district or national forest in Mississippi was analyzed using GIS queries for large blocks of National Forest System management (1000 acres+) with no more than ½- mile of road per 1000 acres and no more than 20 percent of the area in less than 10 year old age class. For each district, areas that passed these initial criteria were then considered based on other wilderness criteria such as lack of other improvements (dwellings, pipelines, developed recreation); remoteness; ability of the area to provide wilderness challenge and solitude; and any special or unique features.

In total, 16 areas forest wide were evaluated and none of the areas met the criteria for potential wilderness areas. Based on findings documented in this process report there were no areas found on the National Forests in Mississippi that qualified for placement on the potential wilderness inventory.

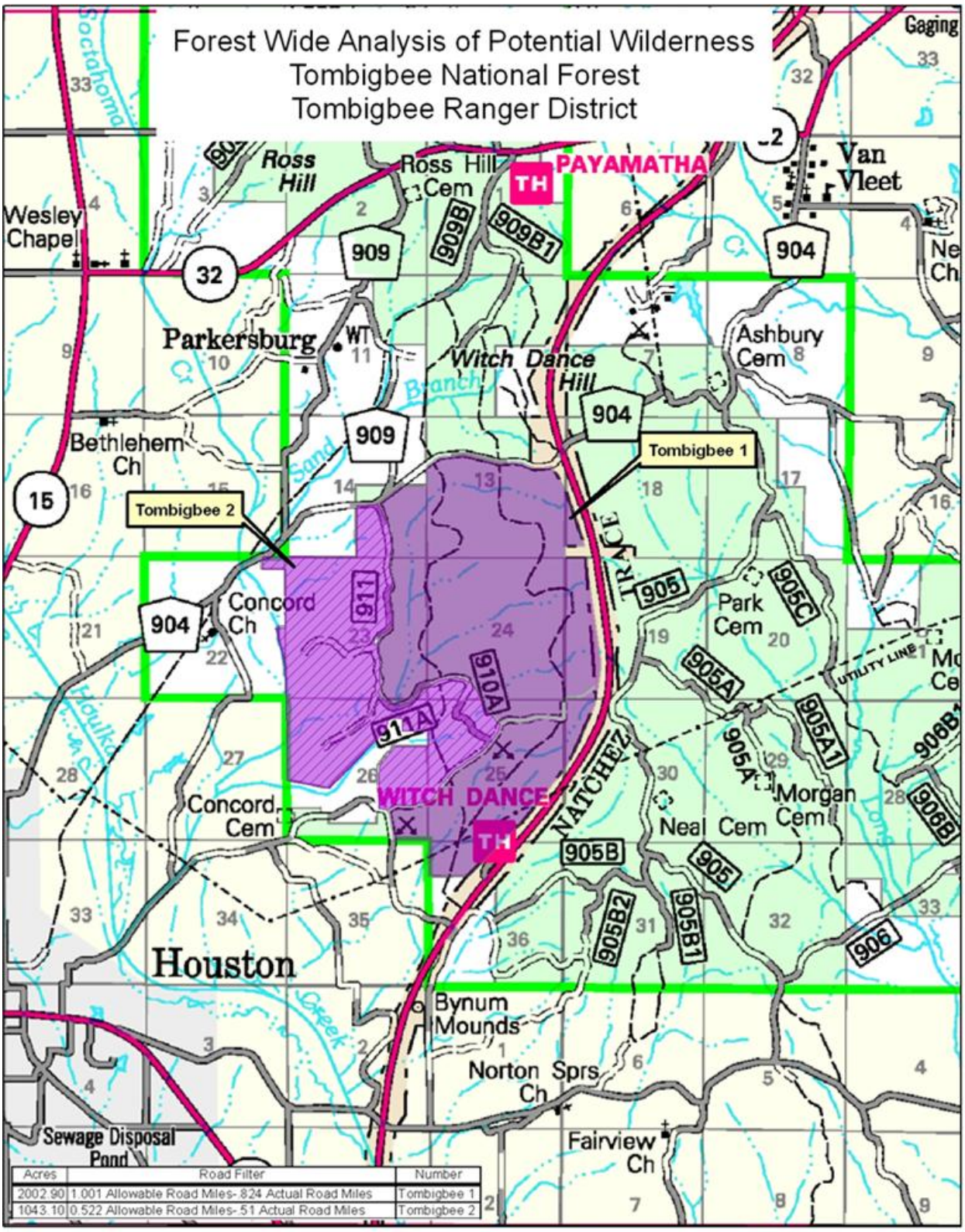


Figure C 18. Map of Tombigbee areas 1 and 2

C.10 Evaluation of Potential Wild and Scenic Rivers

C.10.1 National Rivers Inventory

There are 24 rivers and streams in Mississippi that are on the National Rivers Inventory (NRI). Seven of these inventoried rivers cross portions of National Forest System (NFS) lands. However, due to the intermingled land ownership patterns the majority of the stream channels are located on privately owned tracks.

Inventoried rivers affecting NFS lands in Mississippi were evaluated during development of the 1985 forest plan. A 41 mile segment of the Black Creek on the De Soto National Forest was identified as having the greatest potential for meeting the eligibility criteria for inclusion in the national wild and scenic rivers system. A study report and environmental impact statement were completed resulting in a 21-mile segment of Black Creek being added to the national wild and scenic rivers system as a scenic river on October 30, 1986.

The remaining inventoried rivers affecting NFS administered lands did not meet the eligibility requirements for recommending inclusion in the national system. To date, no substantial changes have occurred in their watersheds that warrant an in depth review or study of their eligibility criteria beyond a preliminary survey or assessment level.

C.10.2 Mississippi - Scenic Streams Stewardship Program

Following passage by Congress of the National Wild and Scenic Rivers Act in 1968, Mississippi's first attempt at a streams bill was in 1969. After six failed attempts at a regulatory streams act, the project was abandoned in 1978. Twenty years later came a renewed effort to have a streams program in Mississippi without regulation. The Mississippi Scenic Stream Stewardship Act was passed in the 1999 legislative session and was signed by the Governor on March 16, 1999. This legislation created the Scenic Streams Stewardship Program which began August 9, 1999.

The Scenic Streams Stewardship Program (SSSP) was designed to promote voluntary private conservation efforts along Mississippi's unique and outstanding rivers and streams. Achievement of the goal will be through use of best management practices (BMPs) which are water quality improvement practices that will maintain the health of streams by keeping stream banks in good condition and preventing harmful sedimentation.

Nominated streams are evaluated by the Mississippi Department of Wildlife, Fisheries and Parks and may then be recommended to the Mississippi Legislature for consideration as eligible. A stream becomes eligible only through adoption and passage of a bill by the Mississippi Legislature. Once eligible, an advisory council is established which follows a public notice and meeting process to consider nomination of an eligible stream to be designated in the scenic streams stewardship program. A stream may be designated only through adoption and passage of a bill by the Mississippi legislature.

Seventeen Mississippi streams have been designated as eligible for nomination into the Scenic Streams Stewardship Program by the Mississippi legislature (1999 – 2008). Ten of the seventeen eligible streams have subsequently been designated by the legislature to the scenic streams stewardship program. Six of the ten designated streams are also on the National Rivers Inventory, along with five streams that are currently listed as eligible for nomination to the Scenic Streams Stewardship Program.

Table C 5. National Rivers Inventory and Scenic Streams Stewardship Program, rivers and streams in Mississippi

River/Stream Name	NFS	NRI	SSSP
Bayou Pierre	No	Yes	N/A
Bear Creek	No	No	Designated
Big Black River	No	Yes	N/A
Black Creek	**Yes**	**Yes**	**Designated**
Bluff Creek	**Yes**	**Yes**	**N/A**
Bogue Chitto River	No	Yes	Eligible
Bowie River and Bowie Creek	No	Yes	N/A
Buttahatchie River	No	Yes	Eligible
Chickasawhay River	No	Yes	N/A
Chunky Creek	No	No	Designated
Chunky River	No	Yes	Designated
Esctawpa	No	No	Eligible
Hatchie River	No	Yes	N/A
Homochitto River	**Yes**	**Yes**	**N/A**
Jourdan River	No	Yes	N/A
Leaf River	No	Yes	N/A
Magees Creek	No	Yes	Designated
Noxubee River	No	Yes	Designated
Okatoma River	No	Yes	Eligible
Pascagoula River	No	Yes	Designated
Pearl River	No	Yes	Eligible
Pearl River	No	Yes	N/A
Red Creek	**Yes**	**Yes**	**Designated**
Strong River	**Yes**	**Yes**	**Eligible**
Tangipahoa River	No	No	Designated
Tchoutacabouffa River	**Yes**	**Yes**	**N/A**
Tombigbee River	No	No	Eligible
Tuxachanie Creek	**Yes**	**Yes**	**N/A**
Wolf River	No	Yes	Designated

C.10.3 Review of Potentially Eligible Rivers

As part of the plan revision process, rivers and streams in Mississippi on the National Rivers Inventory and those eligible or designated in the Mississippi – Scenic Streams Stewardship Program were reviewed to determine if anticipated NFS management may influence or impact their status. Twenty-nine streams are on the combined list (Table C 5). Seven of the rivers and streams flow across NFS administered lands. Also, the undesignated segments from the 1985 Study Report of Black Creek were reviewed for changes in landownership status.

During the forest plan revision process for the National Forests in Mississippi, no individual, group or public entity proposed any streams or rivers to be considered for national wild and scenic river designation. The State of Mississippi does not have a regulated scenic rivers program.

Black Creek Scenic River

The Black Creek Wild and Scenic River was designated by Public Law 99-590 on October 30, 1986. The designated portion of Black Creek begins at Moody's Landing and extends south 21 miles to Fairley Bridge Landing.

A forty-one mile stretch of Black Creek flows through the proclamation boundaries of the De Soto National Forest from Big Creek Landing (Upper Terminus) to Old Alexander Bridge (on Highway 26). This portion of Black Creek was formally studied in the early 1980s to determine eligibility for inclusion in the national system. Because the river has varying characteristics over its length it was divided into three segments which were considered separately for classification. Subsequently, the most isolated segment of the river from Moody's Landing to Fairley Bridge Landing (21 miles) was designated as scenic and added to the national wild and scenic rivers system. Since the River Study and Wild and Scenic River designation in 1986, additional tracts of private lands have been acquired along the original Black Creek Study River corridor.

The 1986 river study indicated that upstream, the twelve mile segment from Big Creek Landing to Moody's Landing was more developed having five bridges near the town of Brooklyn, and a parallel road in several areas, and five of the twelve river miles were on private lands (1986). In 2008, the proportion of private lands along this segment has decreased from five river miles through private lands in 1986 to three river miles. Downstream (in 1986), the seven mile segment from Fairley Bridge Landing to Old Alexander Bridge had a high percentage of private lands and human caused disturbance was more evident along this segment than the middle segment that was ultimately designated as a scenic river. Since the 1986 river study the proportion of private lands in this river segment has declined from 41 percent private ownership to approximately 36 percent private ownership in 2008.

Based on this apparent shift in ownership mix, and considering that ownership, not scenic quality or environmental consideration was the principal factor for not carrying these segments forward in the 1986 designation process, a more detailed and formal river study report for these undesignated portions of the Black Creek corridor may be warranted.

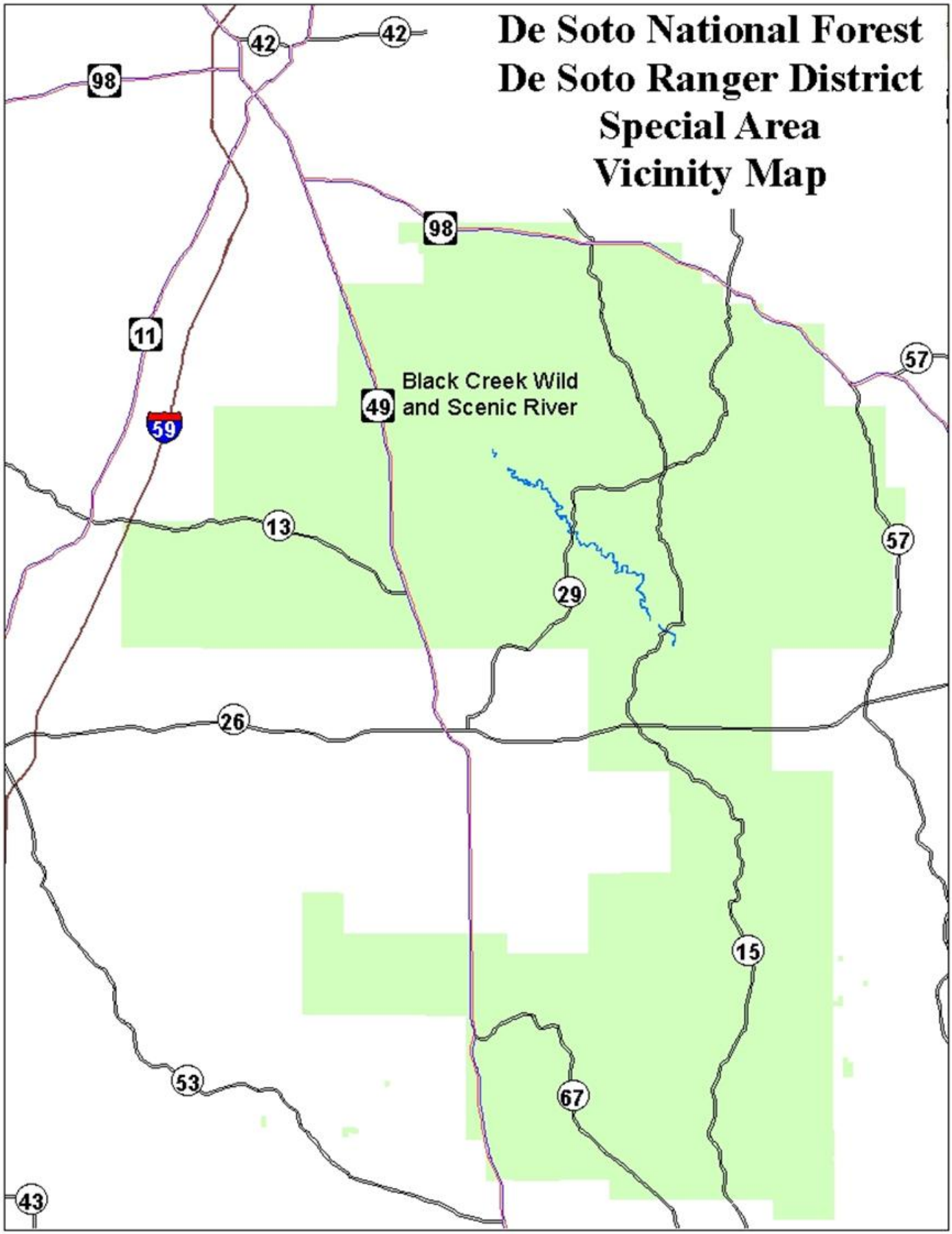


Figure C 19. Map overview of Black Creek scenic river corridor

Black Creek

There are two segments of Black Creek currently in the National Rivers Inventory. The first segment is downstream from the previous river study area, located in Jackson, George, and Stone counties. This segment is 40 river miles long, beginning at the confluence with Pascagoula River upstream to river mile (RM) 40, (MS Highway 26 Bridge). Less than one river mile of this river segment is on NFS administered lands (in Stone County) with the reminder on private lands.

The second segment is located in Forrest, Lamar, Jeff Davis and Marion counties. This second segment begins at RM 76 (Big Creek Landing) and extends upstream to RM 123 (headwaters near Bassfield). Less than two river miles of this National Rivers Inventory segment flows through NFS administered lands in Forrest County.

On April 22, 2004 a segment of the Black Creek from the confluence with the Pascagoula River (Jackson County) to the Mississippi Highway 589 Bridge in Lamar County was designated as a state scenic stream. The state scenic stream overlay the two National Rivers Inventory segments described above, and includes the 21 mile segment on the De Soto National Forest included in the national wild and scenic rivers system. The state scenic stream is located in Forrest, George, Jackson, Lamar, Perry, and Stone, Counties.

Due to the predominance of private ownership along these two segments and the fact that they are designated in the state scenic stewardship program, recommendations for inclusion into the national system have been reserved by and are deferred to the State of Mississippi.

Bluff Creek

The National Rivers Inventory segment of Bluff Creek begins at the confluence with West Pascagoula River and continues upstream to RM 23 (two miles northeast of Larue) in Jackson County. A portion of the headwaters reach into the De Soto National Forest, however the majority of the main stream is on private lands. Bluff Creek has not been designated as eligible for nomination to the state scenic streams stewardship program. Due to the limited amount of NFS lands in its main channel no further recommendation are being considered.

Homochitto River

This National Rivers Inventory segment is 71 river miles long flowing through Adams, Amite, Copiah, Franklin, Lincoln and Wilkinson counties from RM 24 near Sibley to RM 95 near Caseyville at the MS 550 bridge crossing. The Homochitto River flows through the Homochitto National Forest proclamation boundary, however with very few exceptions the river course lies on private lands.

The Homochitto River has not been designated as eligible for nomination to the state Scenic Streams Stewardship Program. Based upon 1986 study records, the portion of the stream on National Forest does not meet eligibility requirements because there are no outstandingly remarkable attributes. No significant changes in the watershed have occurred since the initial study that warrants additional study.

Red Creek

Located in Forrest, George, Jackson, Lamar, Pearl River and Stone counties the National Rivers Inventory segment is 71 river miles in length stretching from the confluence with Black Creek to its headwaters northwest of Lumberton. A segment of Red Creek from Mississippi Highway 26 in Stone County to its confluence with Black Creek in Jackson County was designated as a state scenic stream on March 15, 2006. Portions of Red Creek flow through the De Soto National Forest; however a significant majority of the stream course is on private lands.

Due to the predominance of private ownership and the fact that Red Creek is designated in the state scenic stewardship program, recommendations for inclusion into the national system have been reserved by and are deferred to the State of Mississippi.

Strong River

The National Rivers Inventory segment is 72 river miles long beginning at the confluence with Pearl River upstream to one mile below the I-20 bridge crossing and flows through Scott, Simpson, Smith and Rankin counties. The Strong River became eligible for nomination to the Scenic Streams Stewardship Program on March 16, 1999 but has not been designated by the Mississippi Legislature into the program. The eligible segment is in Simpson, Smith and Rankin counties beginning at the confluence of Beech Creek in Smith County to the Pearl River in Simpson County. Headwaters of the Strong River occur on the Bienville National Forest and the remainder of Strong River occurs on private lands.

Since the headwaters and just a small segment of the main channel occur on NFS administered lands no further recommendations are being considered for inclusion in the national system.

Tchoutacabouffa River

Located in Harrison, Jackson, and Stone counties this National Rivers Inventory segment is from RM 3, above Biloxi, to RM 22, MS Highway 15 Bridge. This segment of the Tchoutacabouffa River was evaluated during the Black Creek River Study (1986) process and was not recommended for carrying forward as a potential wild and scenic rivers candidate. According to the 1986 process records the river portion on NFS lands was not sufficiently outstanding to warrant carrying on the inventory of potential wild and scenic rivers. The Tchoutacabouffa River has not been designated as eligible for nomination to the state scenic streams stewardship program. There have been no significant changes in the watershed to warrant a renewed study.

Tuxachanie Creek

Tuxachanie Creek is in Harrison and Stone counties and flows through the De Soto National Forest. The National Rivers Inventory segment begins at the confluence with Tchoutacabouffa River and continues upstream approximately 28 river miles to its headwaters five miles southeast of Perkinston, Mississippi. Findings from the 1986 study indicate that: the stream is fairly small, upper reaches become intermittent in a dry summer, and NFS lands have no outstanding remarkable attributes along the creek channel. The Tuxachanie Creek has not been designated as eligible for nomination to the state Scenic Streams Stewardship Program. A new study of river attributes' does not appear to be warranted.

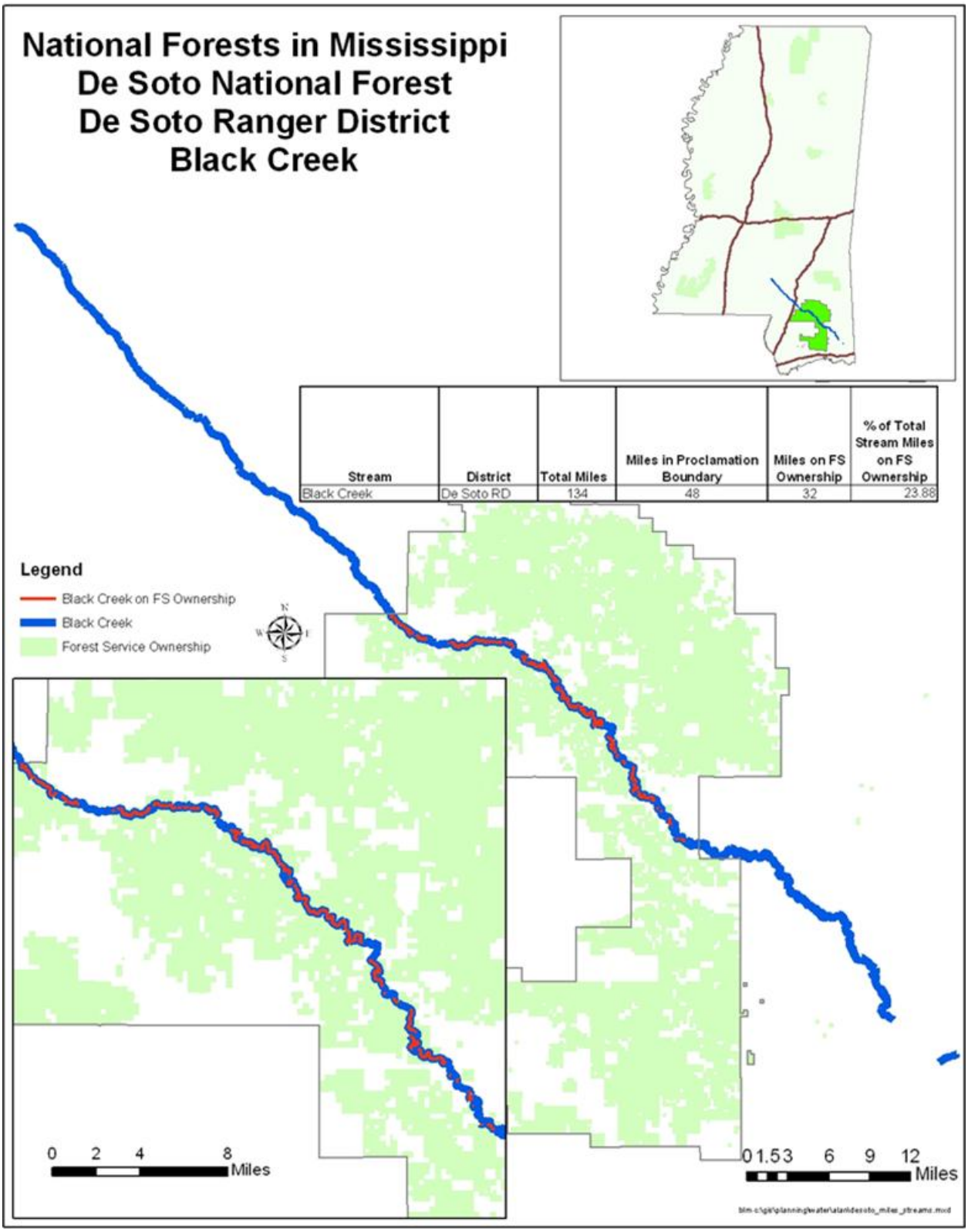

National Forests in Mississippi
De Soto National Forest
De Soto Ranger District
Black Creek
Stream | District | Total Miles | Miles in Proclamation Boundary | Miles on FS Ownership | % of Total Stream Miles on FS Ownership
Black Creek | De Soto RD | 134 | 48 | 32 | 23.88
Legend
Black Creek on FS Ownership
Black Creek
Forest Service Ownership
0 2 4 8 Miles
0 1.5 3 6 9 12 Miles

Figure C 20. Map of Black Creek

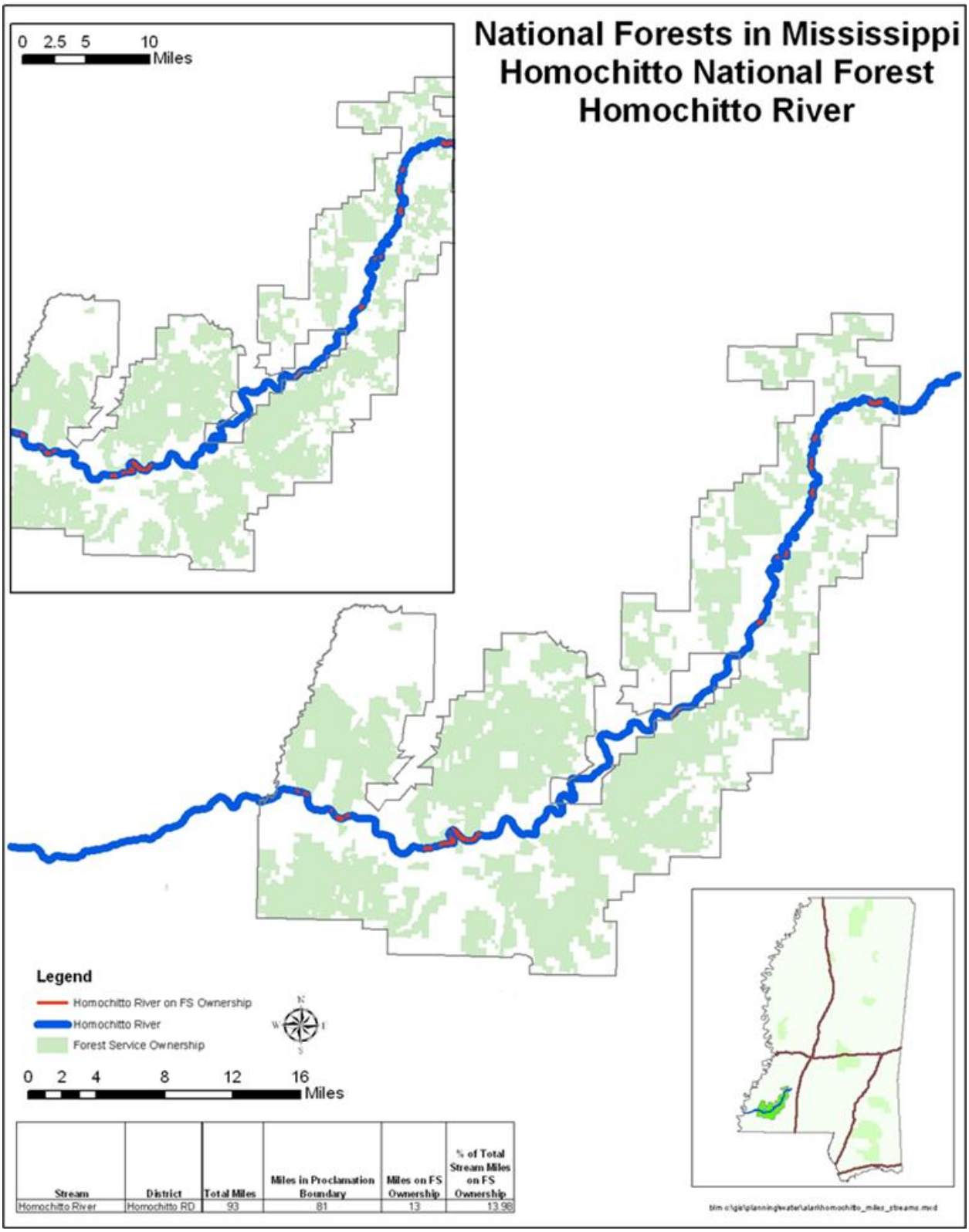
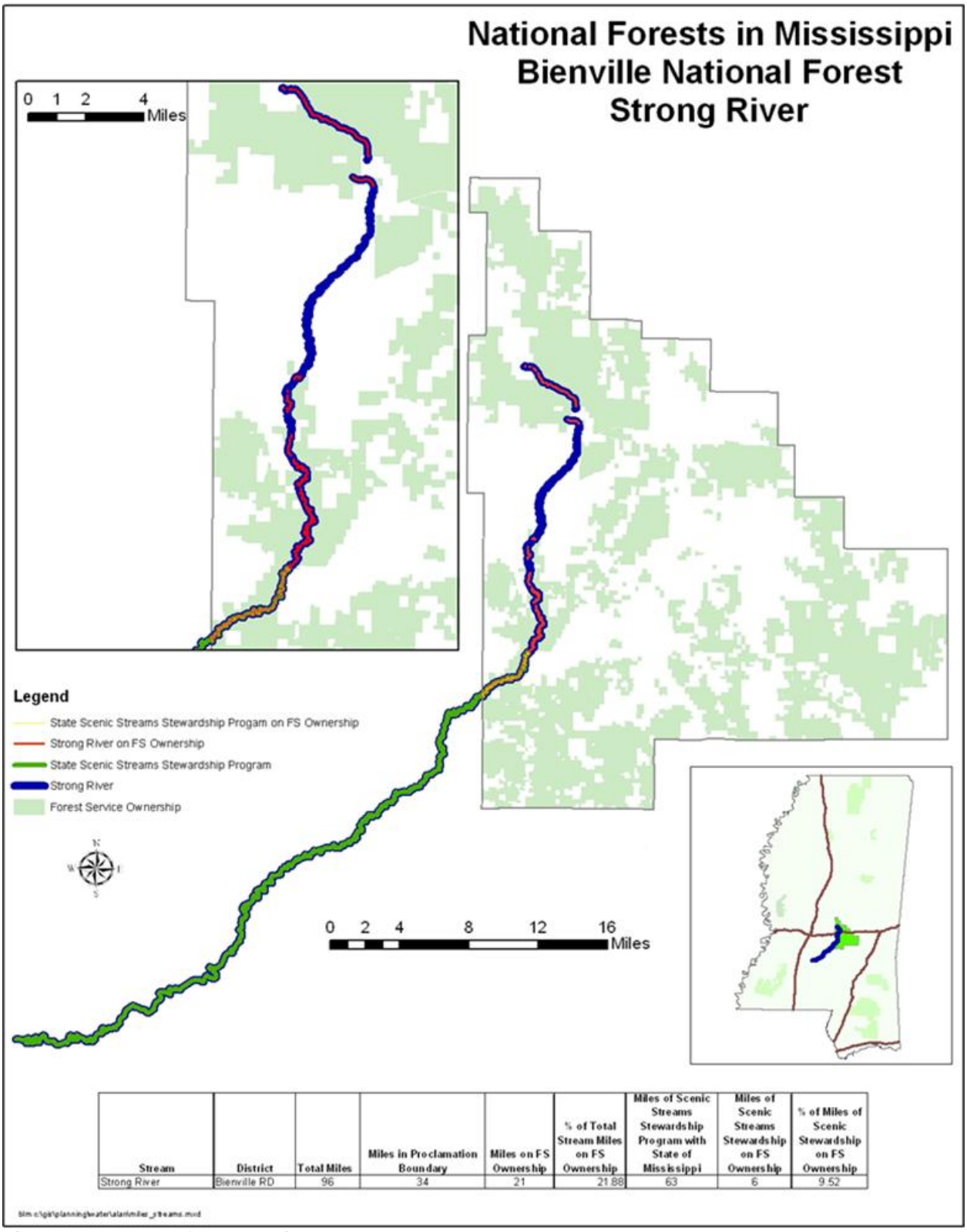


Figure C 21. Map of Homochitto River


National Forests in Mississippi
Bienville National Forest
Strong River
0 1 2 4 Miles
Legend
State Scenic Streams Stewardship Progam on FS Ownership
Strong River on FS Ownership
State Scenic Streams Stewardship Program
Strong River
Forest Service Ownership
0 2 4 8 12 16 Miles

Stream	District	Total Miles	Miles in Proclamation Boundary	Miles on FS Ownership	% of Total Stream Miles on FS Ownership	Miles of Scenic Streams Stewardship Program with State of Mississippi	Miles of Scenic Streams Stewardship on FS Ownership	% of Miles of Scenic Stewardship on FS Ownership
Strong River	Bienville RD	96	34	21	21.88	63	6	9.52

Figure C 22. Map of Strong River

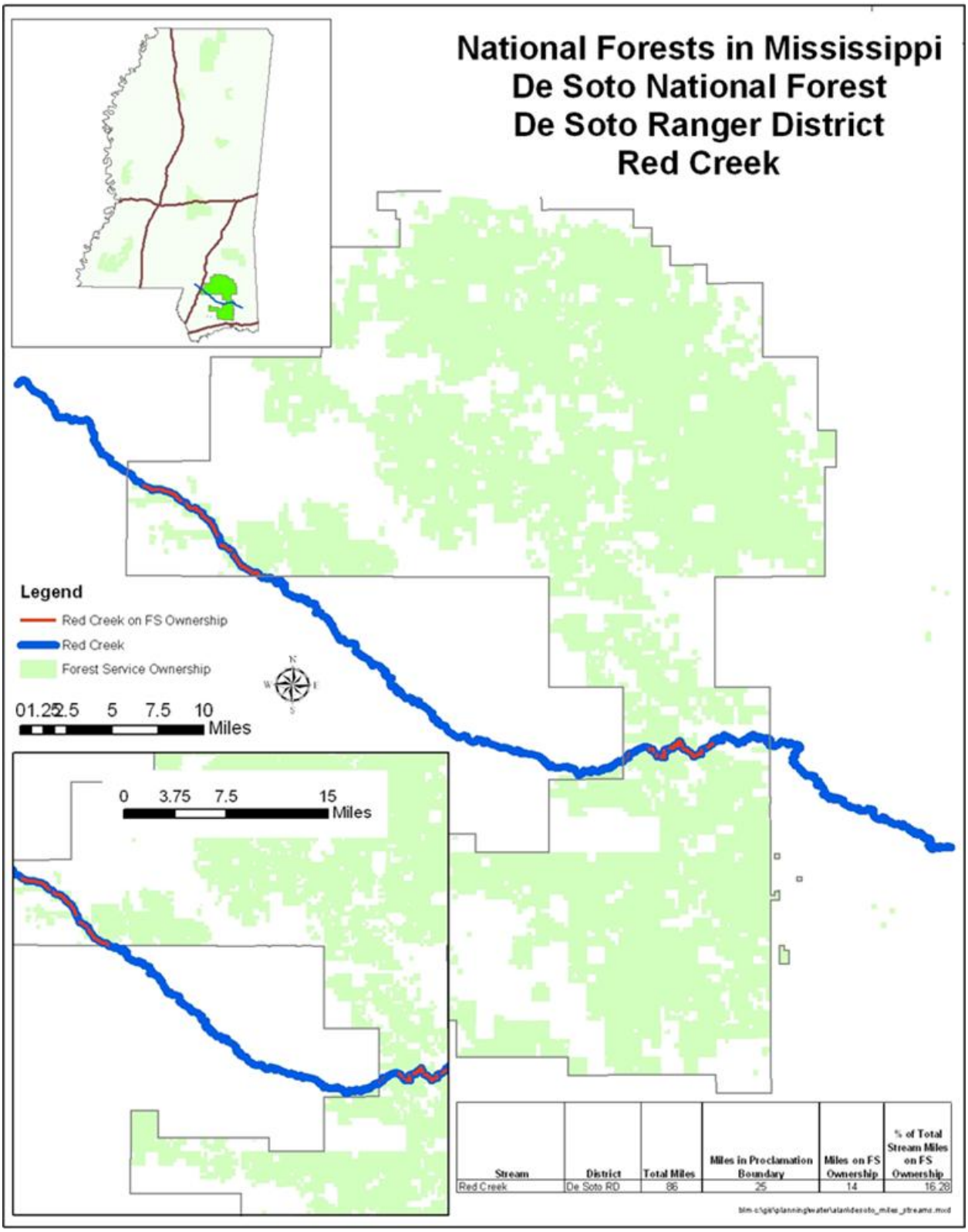


Figure C 23. Map of Red Creek

Appendix D -
Special Areas:
Status, Trends and Strategies

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Appendix D - Special Areas: Status, Trends and Strategies

D.1 Overview

Special areas are areas within the National Forest System designated because of their unique or special characteristics. This forest plan recognizes 19 special areas on the National Forests in Mississippi that are currently designated by statute or through prior administrative processes. Another 20 potential special areas distributed across 7 districts have been proposed for evaluation and possible future designation as botanical areas, research natural areas.

D.2 Designated Special Areas

The designated special areas on the National Forests in Mississippi include a variety of distinctive settings with exceptional or uncommon botanical, scenic, research, wilderness, recreational, or archaeological values. Special areas contribute a variety of desired conditions including providing sites for native ecosystems, habitats for species diversity, refuge areas for aquatic and terrestrial wildlife and threatened and endangered species, mid-sized to large patches of old growth forest communities, experimental sites for vegetation management practices, unique recreational opportunities, and desirable scenic conditions. Designating and managing these areas for their special characteristics contribute to our strategy for moving toward desired conditions. Specific guidance for managing the various categories of special areas are identified in Forest Service policies and directives, national requirements, or individual management plans.

Some designated special areas are mature examples of desired ecosystems and serve as some of the best locations of mid-sized or larger expanses of old growth conditions on the National Forests in Mississippi. Designated botanical special areas are generally good representatives of native ecological systems such as longleaf pines, floodplain hardwoods, prairies, or southern mesophytic forests. These sites provide habitats for threatened and endangered, sensitive and locally rare species as well as habitat for an array of characteristic and popular demand species. Other locations such as the two designated wilderness areas are also protected, and monitored to preserve their natural conditions and provide habitat for sustaining a diversity of species.

Desired conditions for healthy and resilient forests are supported by experimental forests and research natural areas that serve as sites for a broad range of studies such as stand management, watershed management, restoration of wildlife and plant populations, maintenance of biological diversity, and effects of disturbances such as climate change. Some special areas are less disturbed than is typical for this region and provide a valuable baseline for monitoring changes in natural conditions on National Forest System lands.

Scenic areas contribute to the desired naturally appearing character of the National Forests in Mississippi, including the old growth loblolly-shortleaf pine forests on the Bienville Pines Scenic Area and the picturesque river setting along the Black Creek Wild and Scenic River. The “Unmanaged Forty” recreational special area is part of the Gavin Auto Tour of southern Mississippi’s pine forests and contributes to recreation management strategies, while the Owl Creek Mounds and the Dowling Bayou archaeological sites protect Indian mounds and village sites and support the desired conditions for cultural resources.

Table D 1 displays a list of existing designated special areas, their sizes, and the district on which they occur. Following the table are brief descriptions of these designated special areas.

Table D 1. Designated special areas of the National Forests in Mississippi

Area Name	Designation	District	Acres
Bienville Pines Scenic Area	Scenic Area	Bienville	189
Harrell Prairie Botanical Area	Botanical Area	Bienville	153
Unmanaged Forty	Recreation Area	Chickasawhay	41
Tiger Creek Botanical Area	Botanical Area	Chickasawhay	375
Red Hills Botanical Area	Botanical Area	De Soto	194
Harrison Experimental Forest	Experimental Forest	De Soto	4066
Black Creek Wild & Scenic River	National Scenic River	De Soto	21 miles
Black Creek Corridor	Scenic Area	De Soto	9,149
Harrison Research Natural Area	Research Natural Area	De Soto	113
Black Creek Wilderness Area	Wilderness Area	De Soto	5,052
Leaf River Wilderness Area	Wilderness Area	De Soto	994
Dowling Bayou Archaeological Site	Archaeological Area	Delta	10
Red Gum Research Natural Area	Research Natural Area	Delta	40
Overcup Oak-Water Hickory Research Natural Area	Research Natural Area	Delta	40
Green Ash – Sugarberry Research Natural Area	Research Natural Area	Delta	67
Tallahatchie Experimental Forest	Experimental Forest	Holly Springs	3,502
Owl Creek Mounds Archaeological Site	Archaeological Area	Tombigbee	29
Noxubee Crest Research Natural Area	Research Natural Area	Tombigbee	552
Chuquatonchee Bluffs Research Natural Area	Research Natural Area	Tombigbee	218

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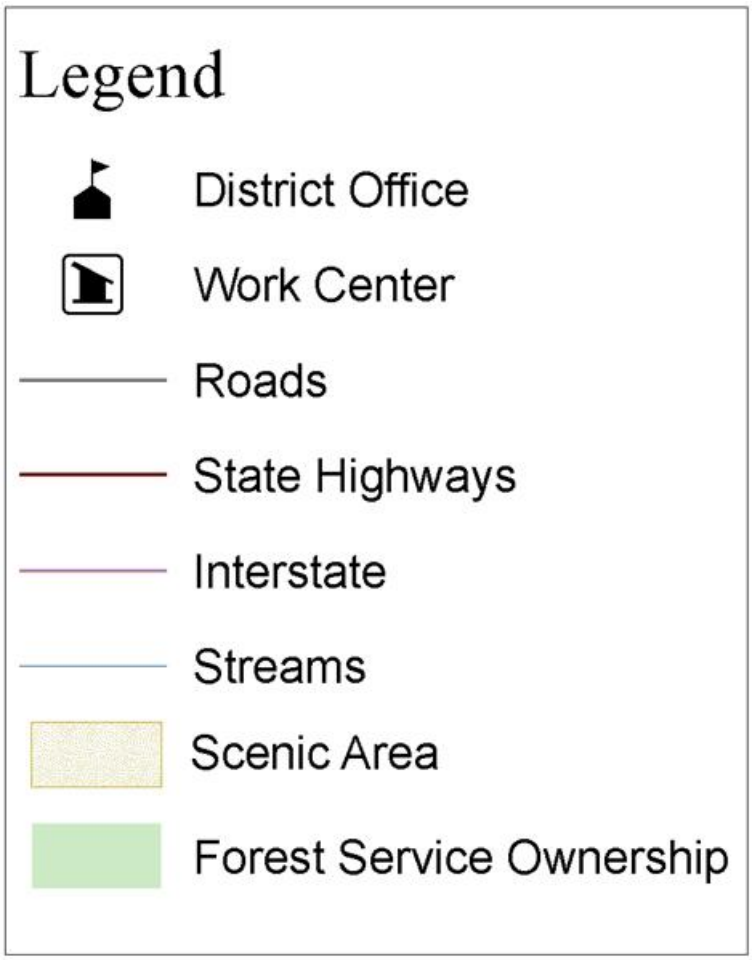
D.2.1 Bienville Pines Scenic Area (Bienville National Forest):

The Bienville Pines Scenic Area is a designated national natural landmark and was established to showcase the original old-growth loblolly pine – shortleaf pine forest that was typical of the area before logging. The mill owner kept the site from being logged as a monument to what was, and it was passed on to the Forest Service intact. The Bienville Pines Scenic Area continues to provide visitors the opportunity to witness trees that were once part of the original forest before logging and to witness the effects of change as these old trees are dying of natural causes and being replaced.



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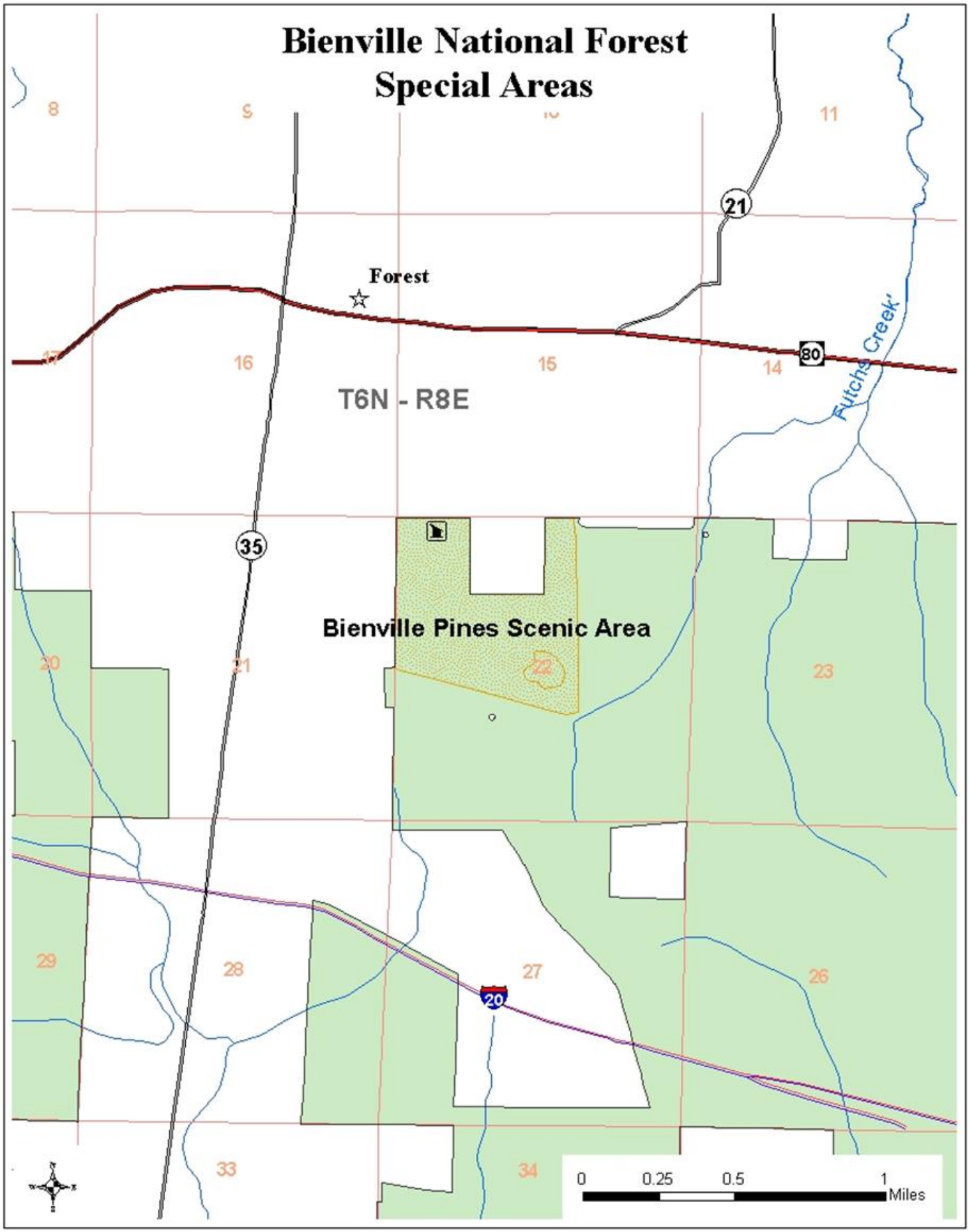
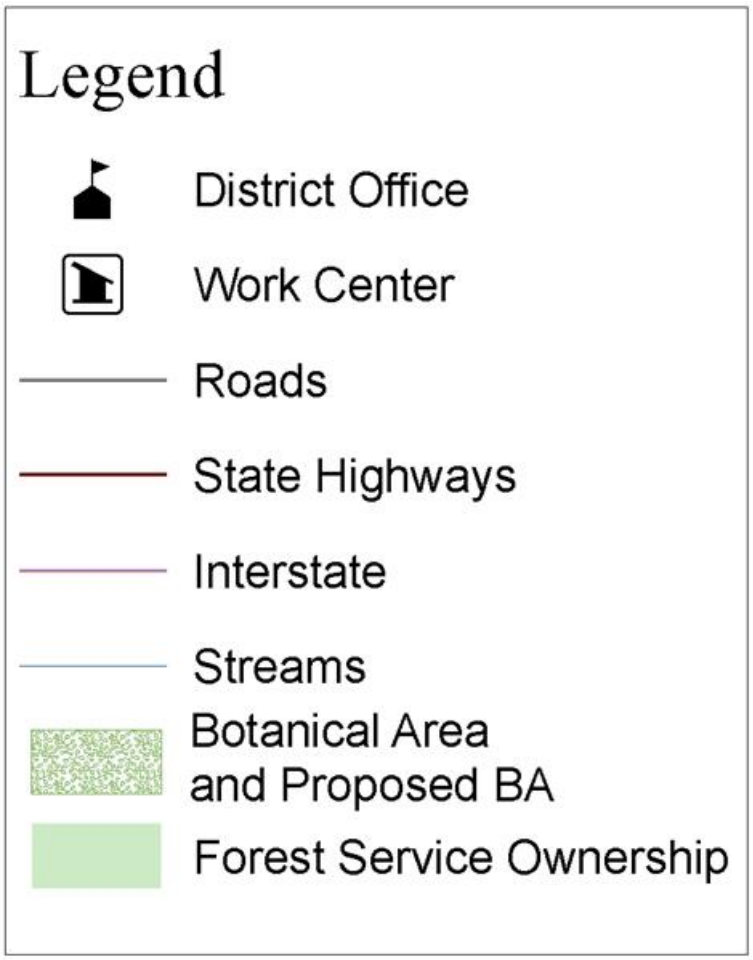


Figure D 1. Map of Bienville Pines Scenic Area

D.2.2 Harrell Prairie Botanical Area (Bienville National Forest):

Harrell Prairie Hill comprises the largest and best example of native tall grass prairie from the Jackson prairie and is designated as a national natural landmark. It has been the focus of restoration work dating back to the mid-1980s and is further along in restoration than any other known relict of this type in Mississippi. The Jackson prairie is healthy and provides the necessary habitat conditions to support a full array of native prairie species such as indiangrass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, prairie cone-flowers, and others.



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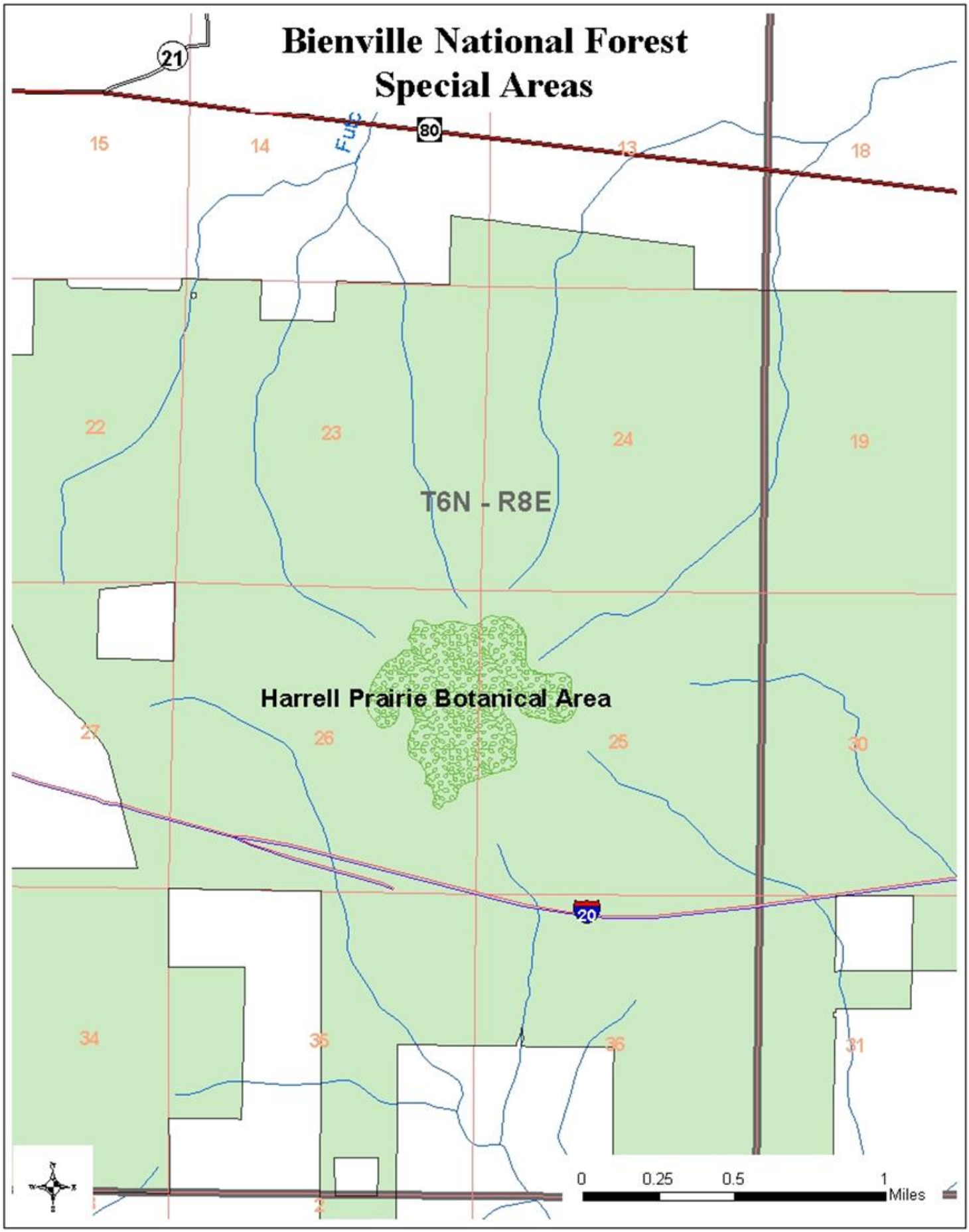
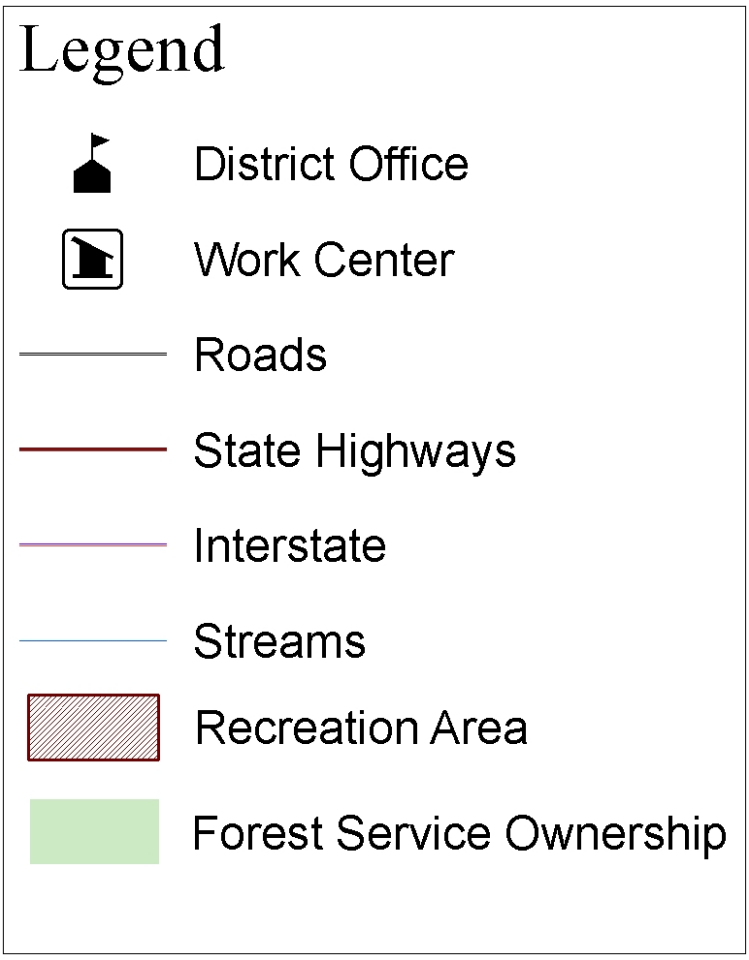


Figure D 2. Map of Harrell Prairie Botanical Area

D.2.3 Unmanaged Forty Recreation Area (Chickasawhay Ranger District, De Soto National Forest):

The “Unmanaged Forty” is part of the 1935 Gavin Slash Pine Plantation and has been withdrawn from timber and fire management activities by forest supervisors since 1945. It is part of the Gavin auto tour. This auto tour uses interpretive signs to inform visitors about south Mississippi's beautiful pine forests, and the practices used to manage these renewable resources. Sites along the 11-mile tour include mature pine timber; natural and artificial regeneration areas; game forage plots; prescribed burn areas; and this unmanaged 40 acres of timber. This site continues to be managed so that scenic and recreational experiences for visitors are maintained or improved.



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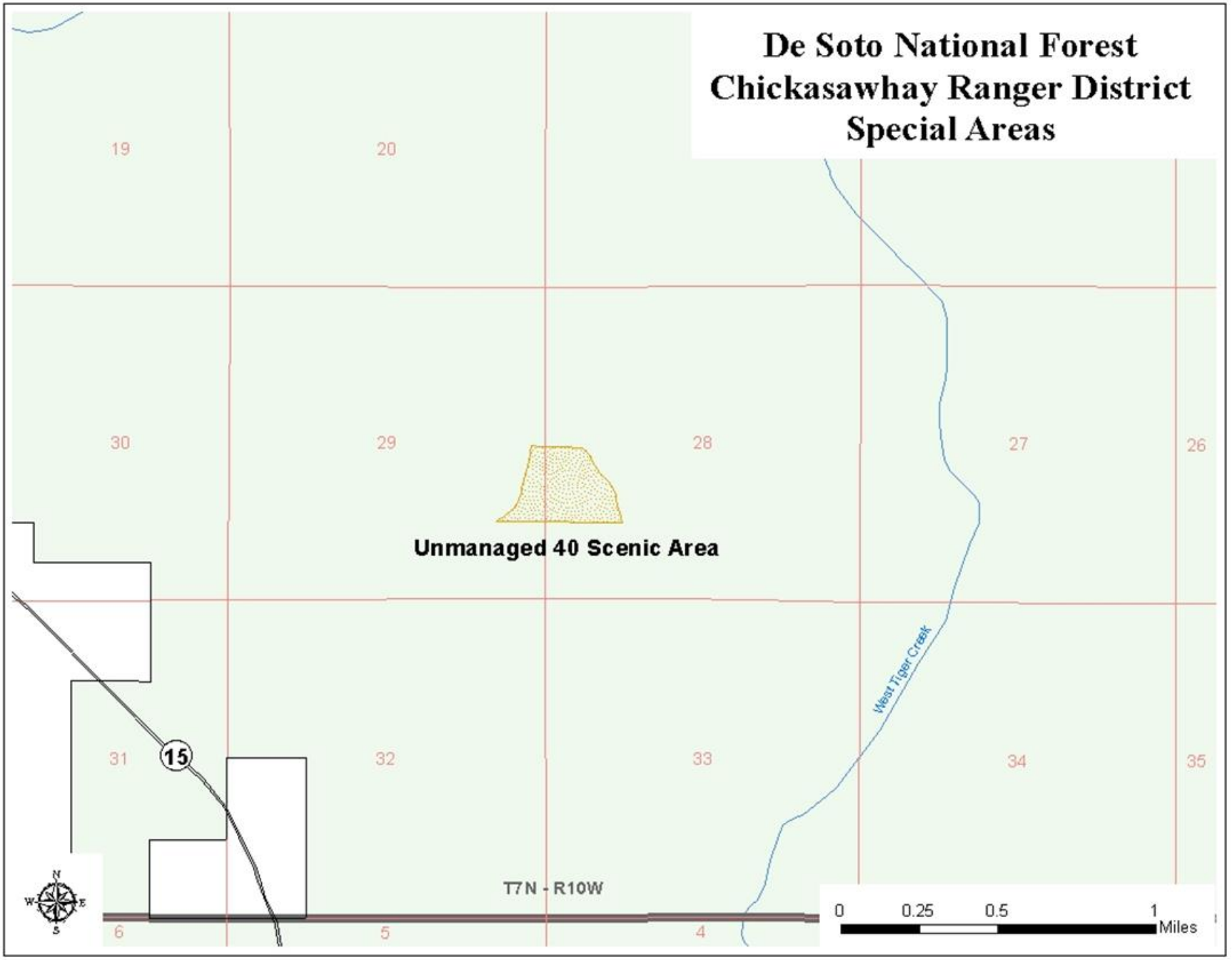
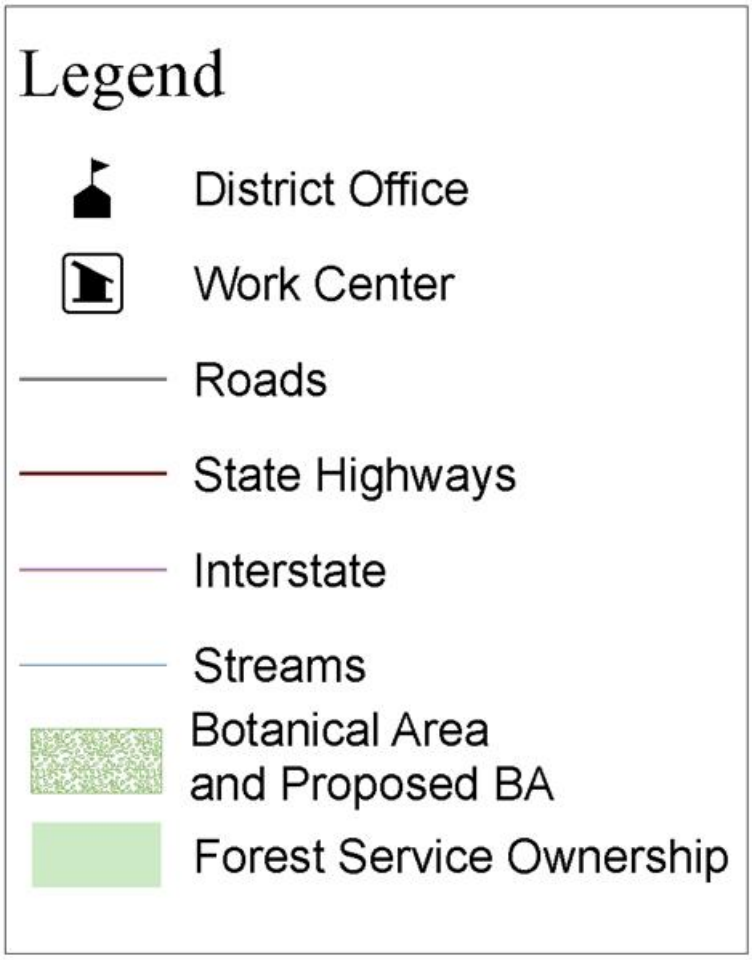


Figure D 3. Map of Unmanaged 40 Recreation Area

D.2.4 Tiger Creek Botanical Area (Chickasawhay Ranger District, De Soto National Forest):

This site is located on a minor stream bottom. Dominant species are white oak, Southern magnolia and loblolly pine. As an undisturbed representation of a floodplain forest ecological community, the area serves as an area in which natural biological diversity is conserved. This area was located, delineated and moved through the designation process by the district staff as a replacement for Thompson Creek Bottom Botanical Study Area listed in the 1985 forest plan for the National Forests in Mississippi. This was done because there were not good records on the intended location of the Thompson Creek Bottom Botanical Study Area. It was also evident the Thompson Creek location had been damaged by wind.



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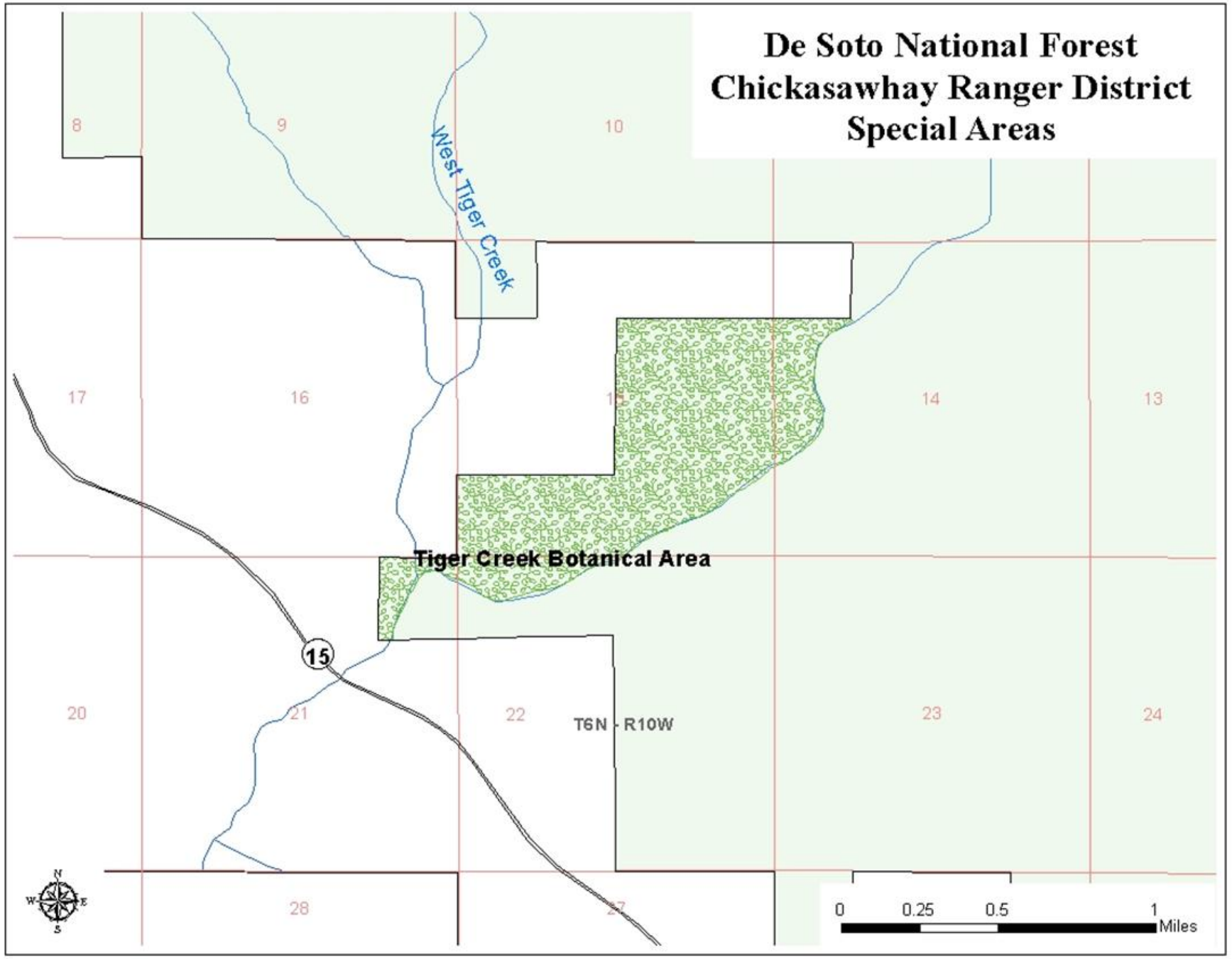
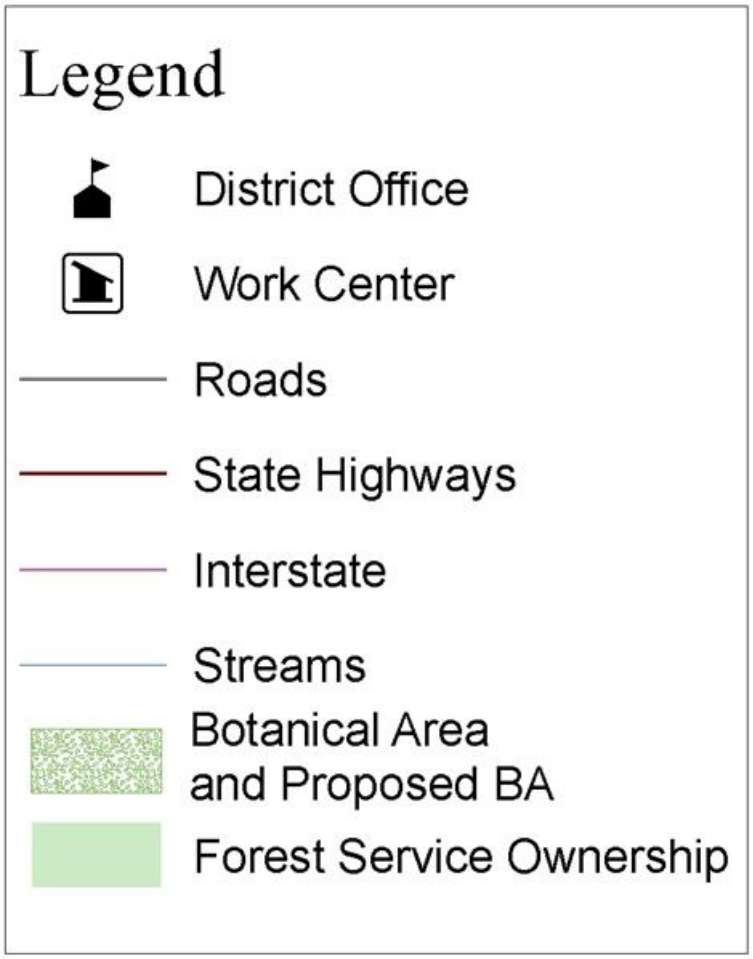


Figure D 4. Map of Tiger Creek Botanical Area

D.2.5 Red Hills Botanical Area (De Soto Ranger District, De Soto National Forest):

The Red Hills are an area of deeply dissected terrain overlooking Black Creek. The ridge tops, moist slopes, and ravines support a rich flora typical of the forest commonly called “beech-magnolia.” The southern mesophytic forest is intact and the hydrologic function of associated springs and seeps is intact.



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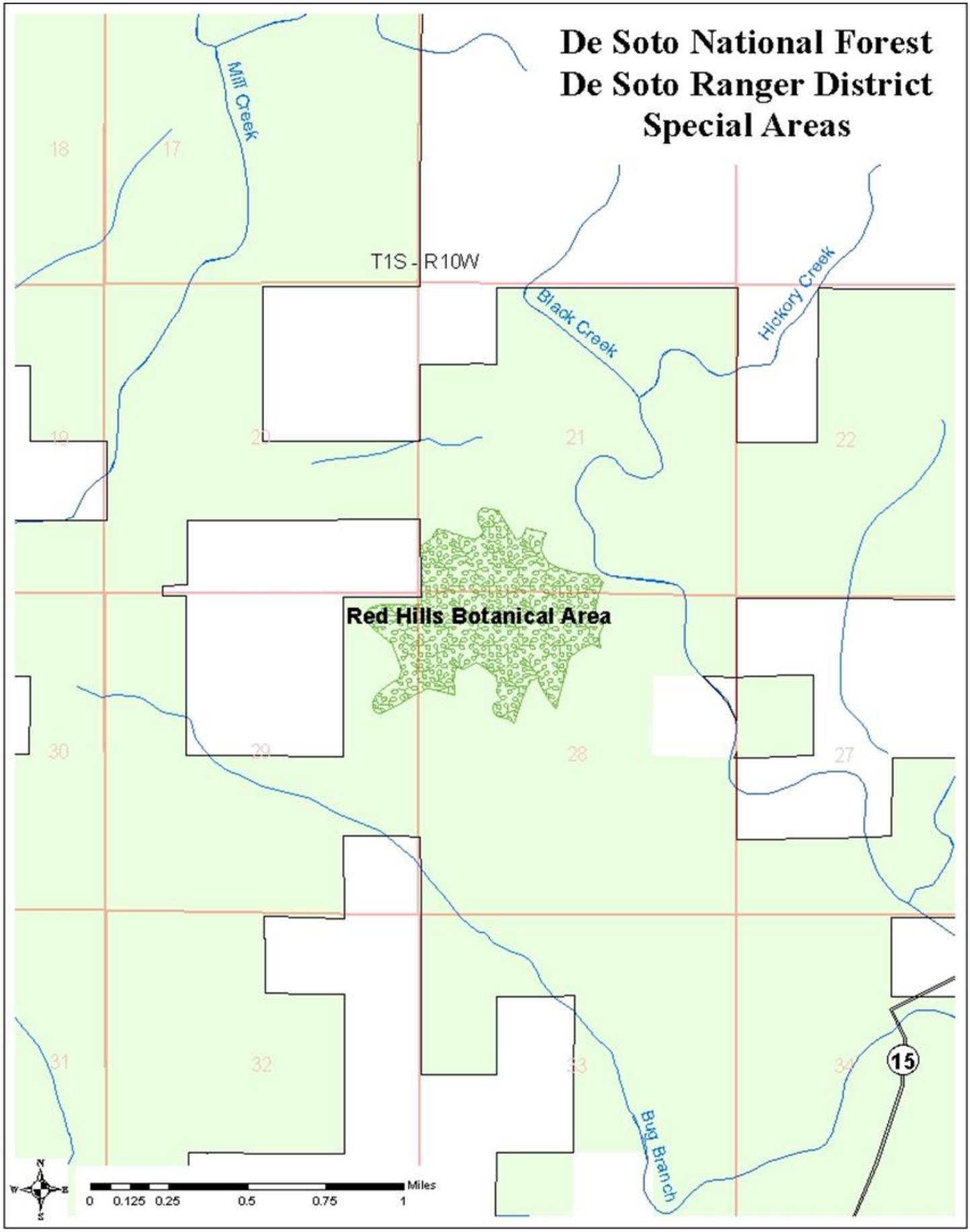
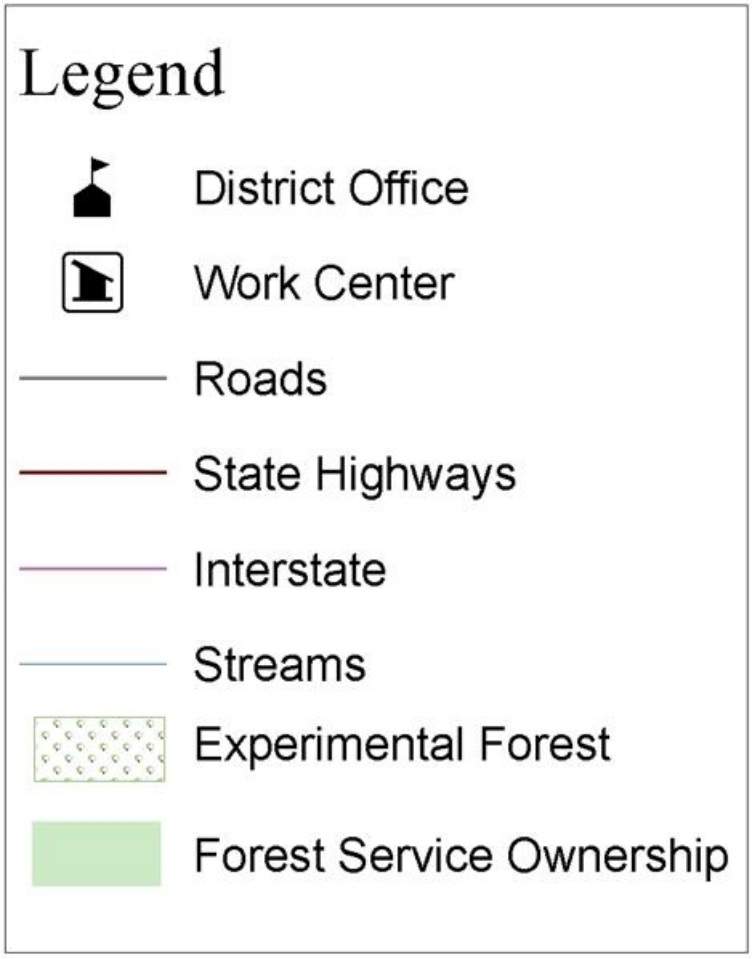


Figure D 5. Map of Red Hills Botanical Area

D.2.6 Harrison Experimental Forest (De Soto Ranger District, De Soto National Forest):

Scientists in Forest Service research work units use the Harrison Experimental Forest as a site for their studies and demonstration projects in conjunction with the National Forests in Mississippi and the De Soto Ranger District. Among the experiments conducted on this forest are studies on stand management and regeneration; restoration of wildlife and plant populations; watershed management; and the effects of pollution, climate change, and timber harvest.



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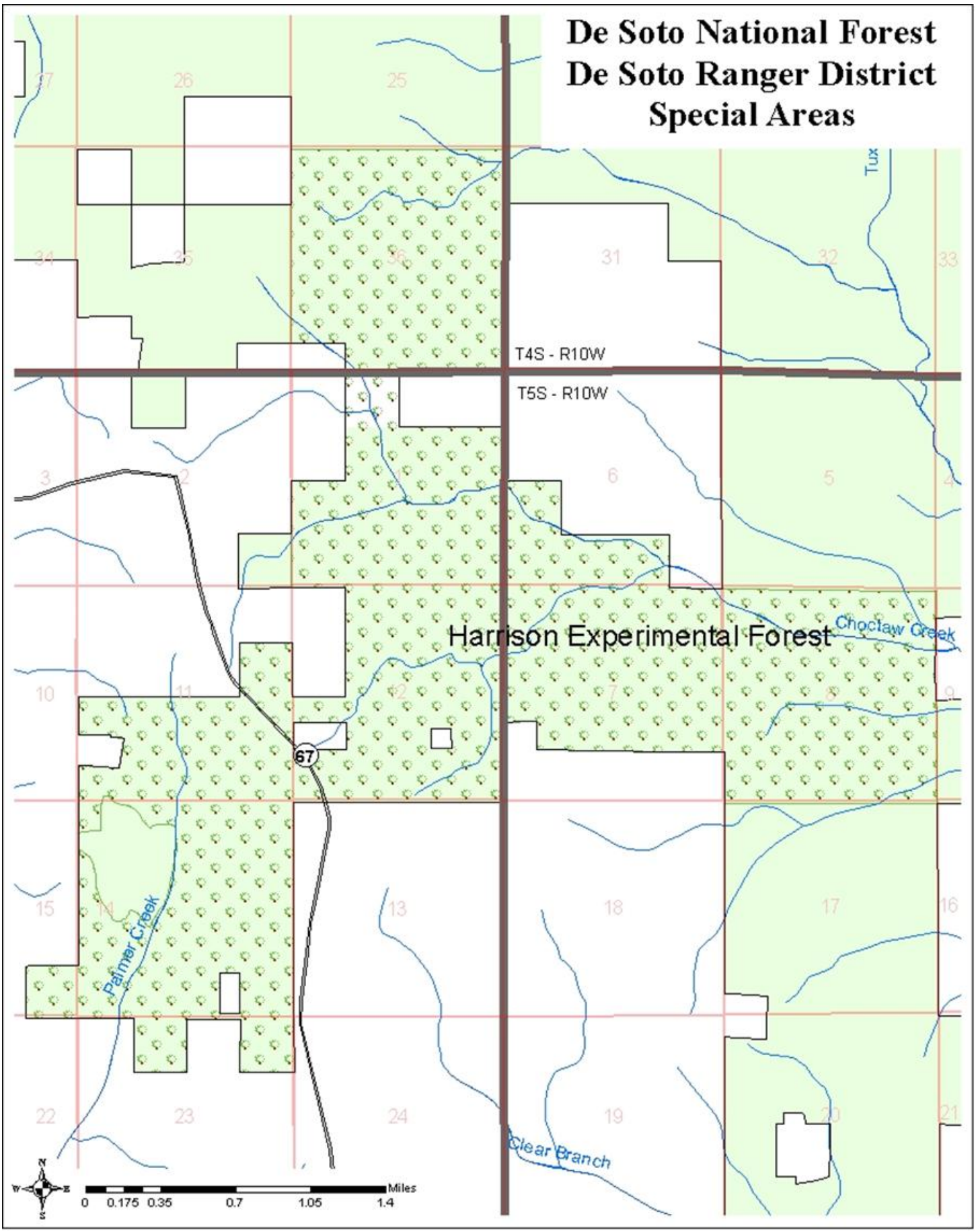
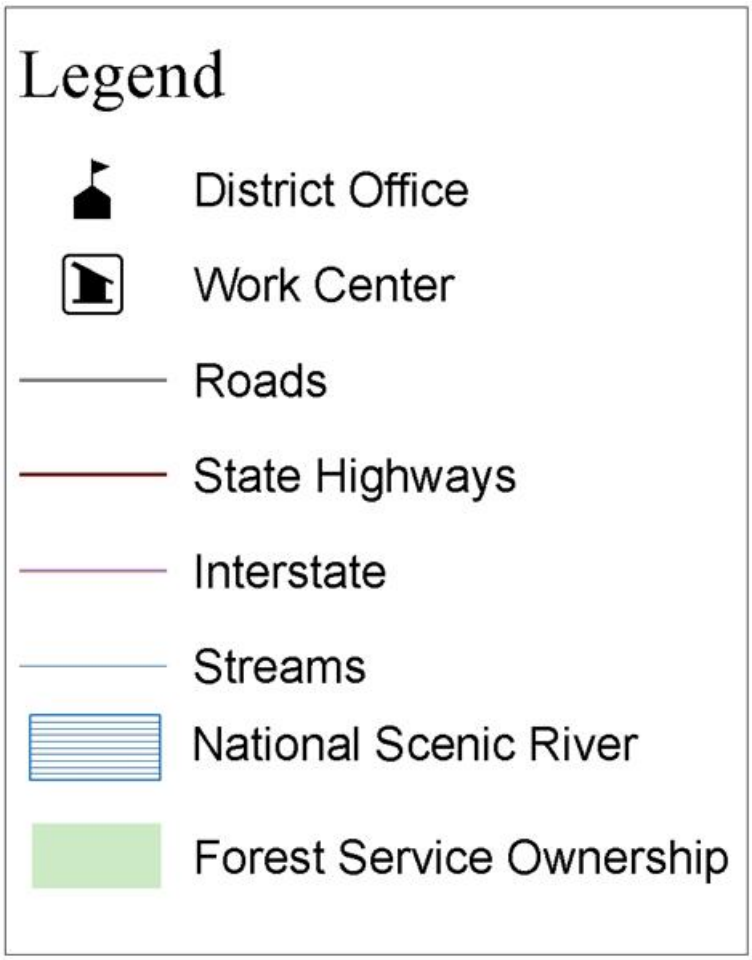


Figure D 6. Map of Harrison Experimental Forest

D.2.7 Black Creek Wild and Scenic River (De Soto Ranger District, De Soto National Forest):

Black Creek is the only congressionally designated wild and scenic river in the state. It is a tributary of the Pascagoula River, which flows into the Gulf of Mexico. Twenty-one miles of Black Creek within the De Soto Ranger District (between Moody's Landing and Fairley Bridge Landing) are designated in a scenic classification. Generally, Black Creek has been described as having outstanding scenery due to the highly varied terrain, wide sandbars, overhanging vegetation and steep bluffs. Moss-covered banks and colorful vertical bluffs add to the picturesque setting. Little evidence of man is noticeable along the designated river except where Highway 29 crosses near Janice Landing. The outstandingly remarkable values (ORVs) are the scenery and recreational attributes which make the river corridor a popular destination for canoeing, fishing, and other water based recreation. Black Creek is also potential habitat for the federally threatened Gulf sturgeon. A system of trails provides access along the Black Creek corridor. The Black Creek Trail is a designated national recreation trail.

A total of 41 miles of Black Creek were studied for wild and scenic river suitability and only 21 miles were deemed eligible and hence became the congressionally designated Black Creek Wild and Scenic River in 1986. The density of private land in these un-designated sections of the creek was a key issue in why these segments were not included in the congressional designation. As lands are acquired within the designated or un-designated portions of Black Creek they will be evaluated for annexation and expanding the scenic river corridor.



Legend for Figure D 7 through Figure D 12

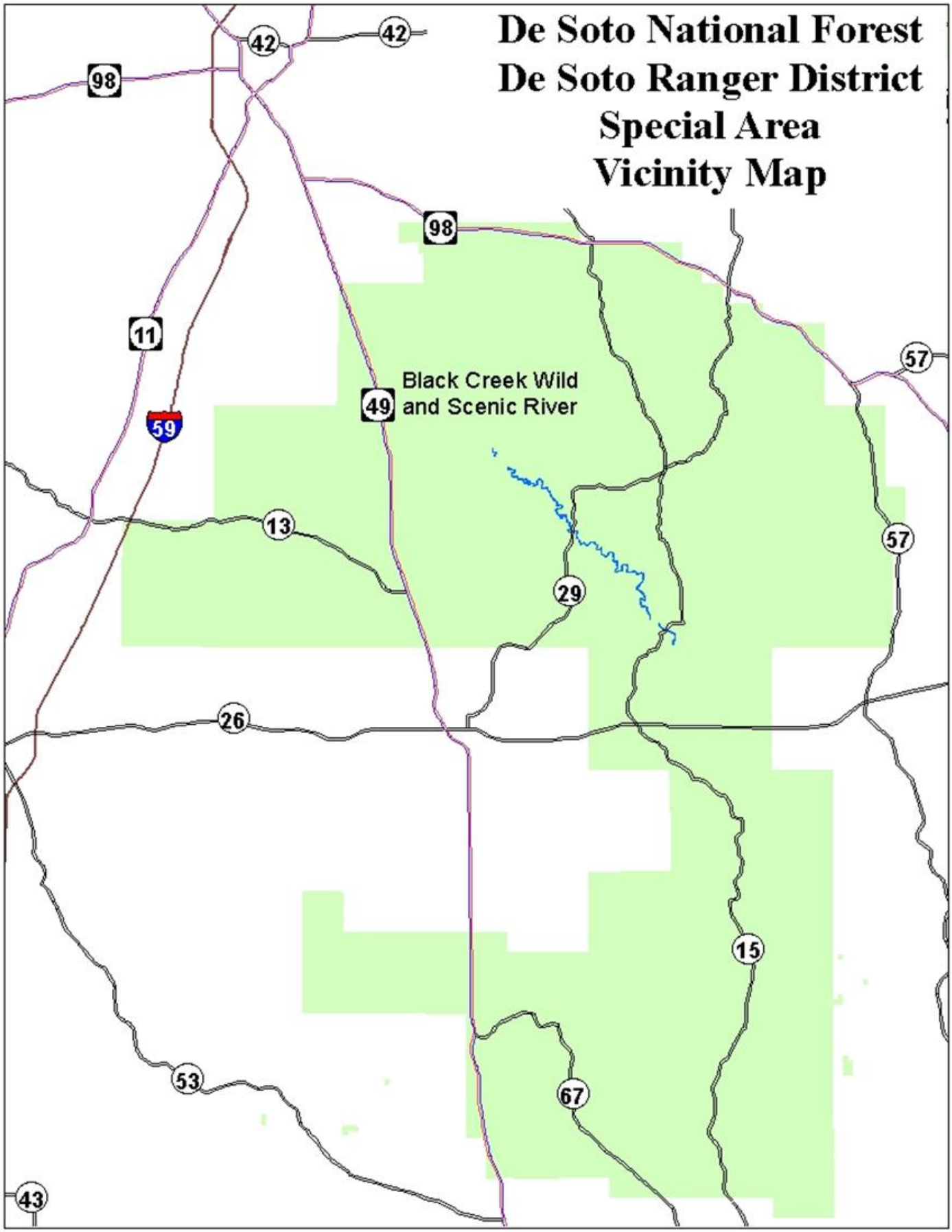


Figure D 7. Vicinity map for the Black Creek Wild and Scenic River

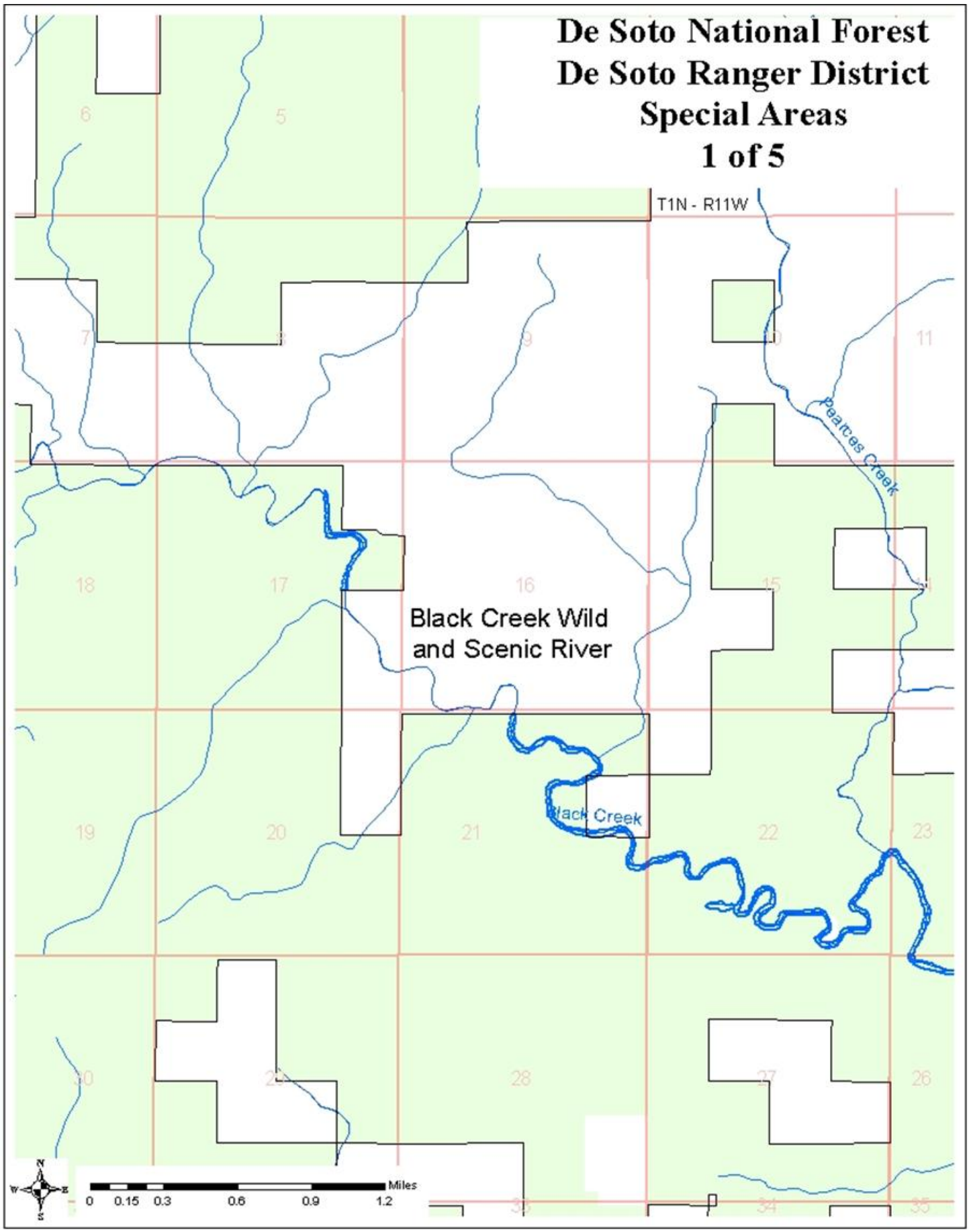


Figure D 8. Black Creek Wild and Scenic River map 1 of 5

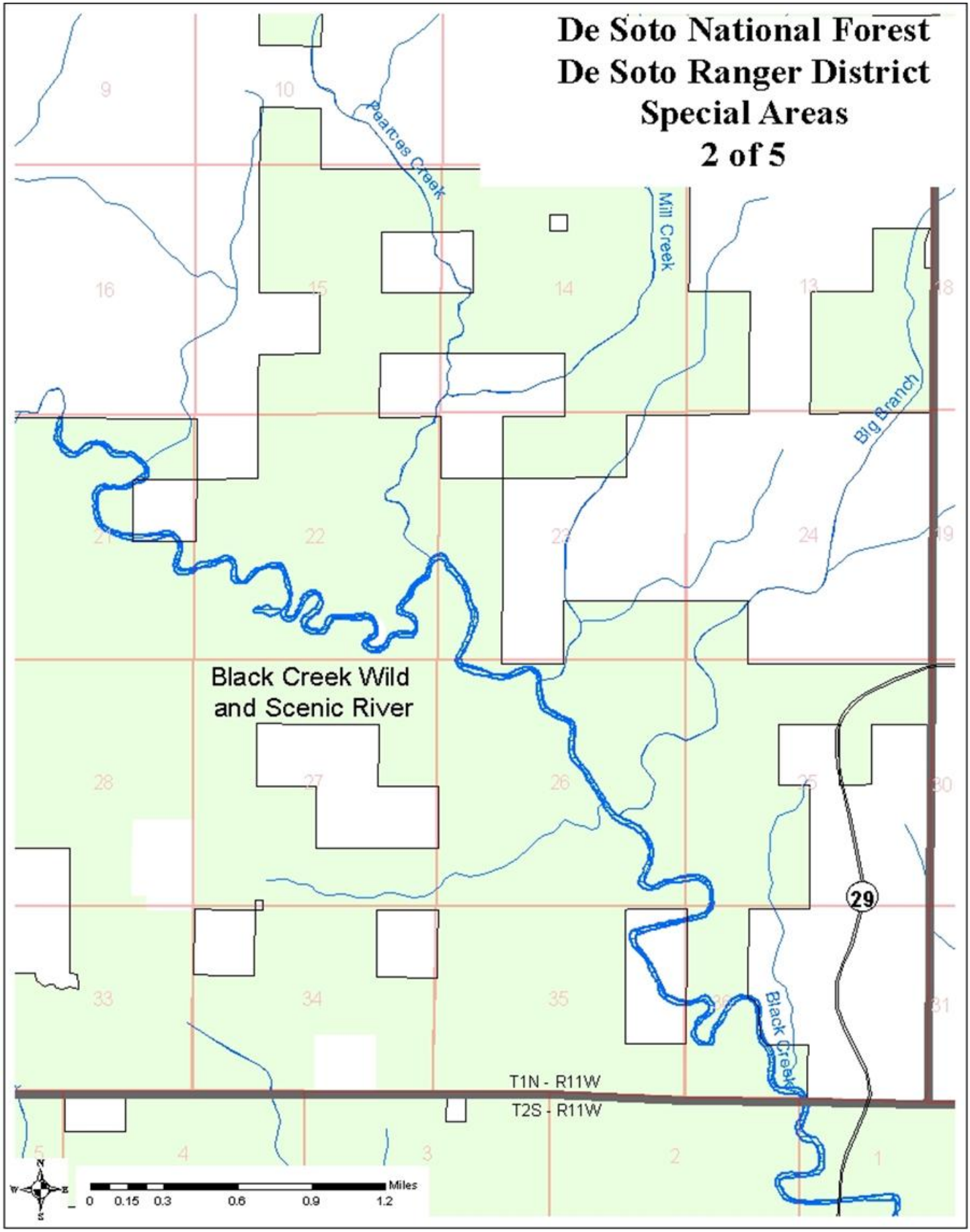


Figure D 9. Black Creek Wild and Scenic River map 2 of 5

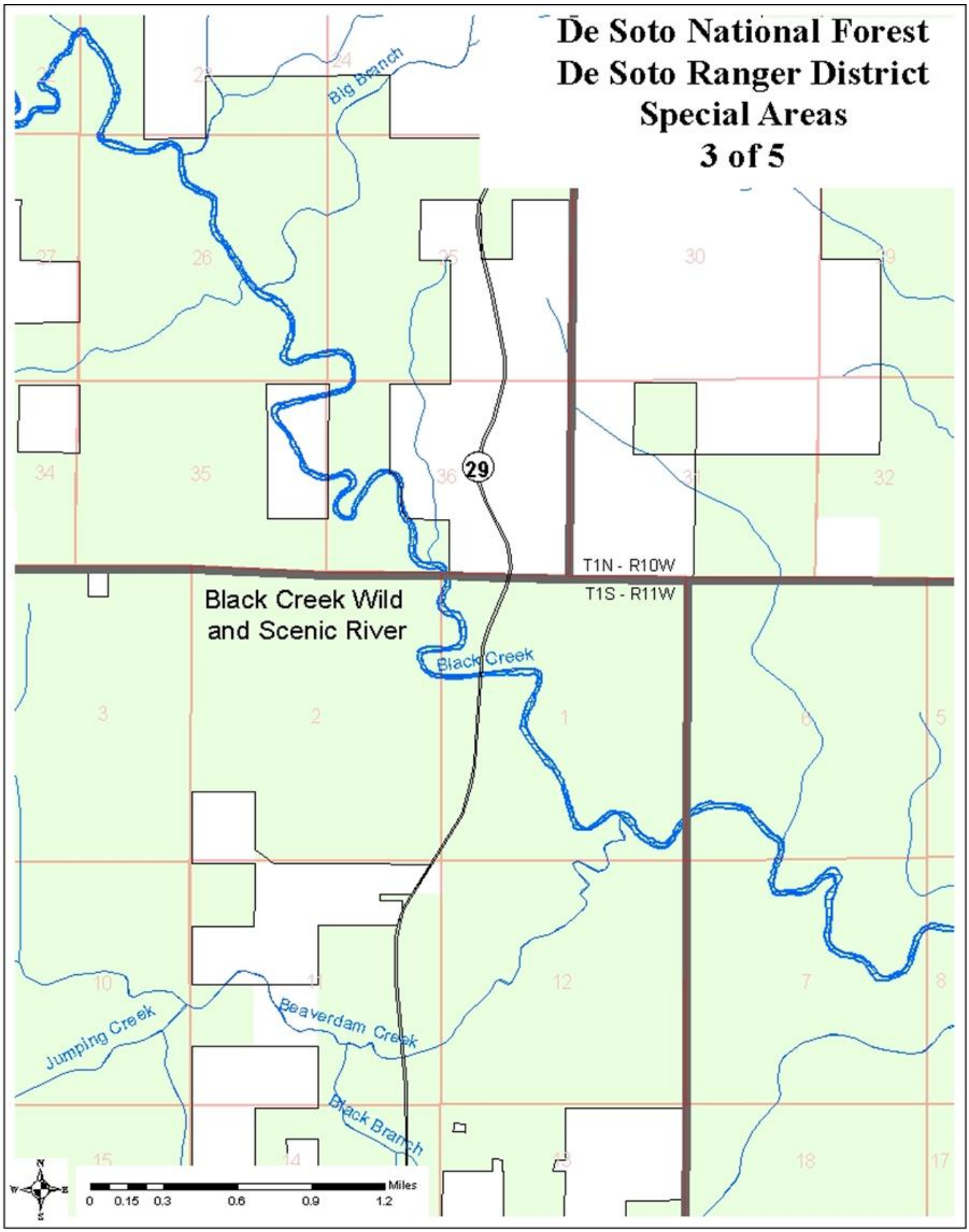


Figure D 10. Black Creek Wild and Scenic River map 3 of 5

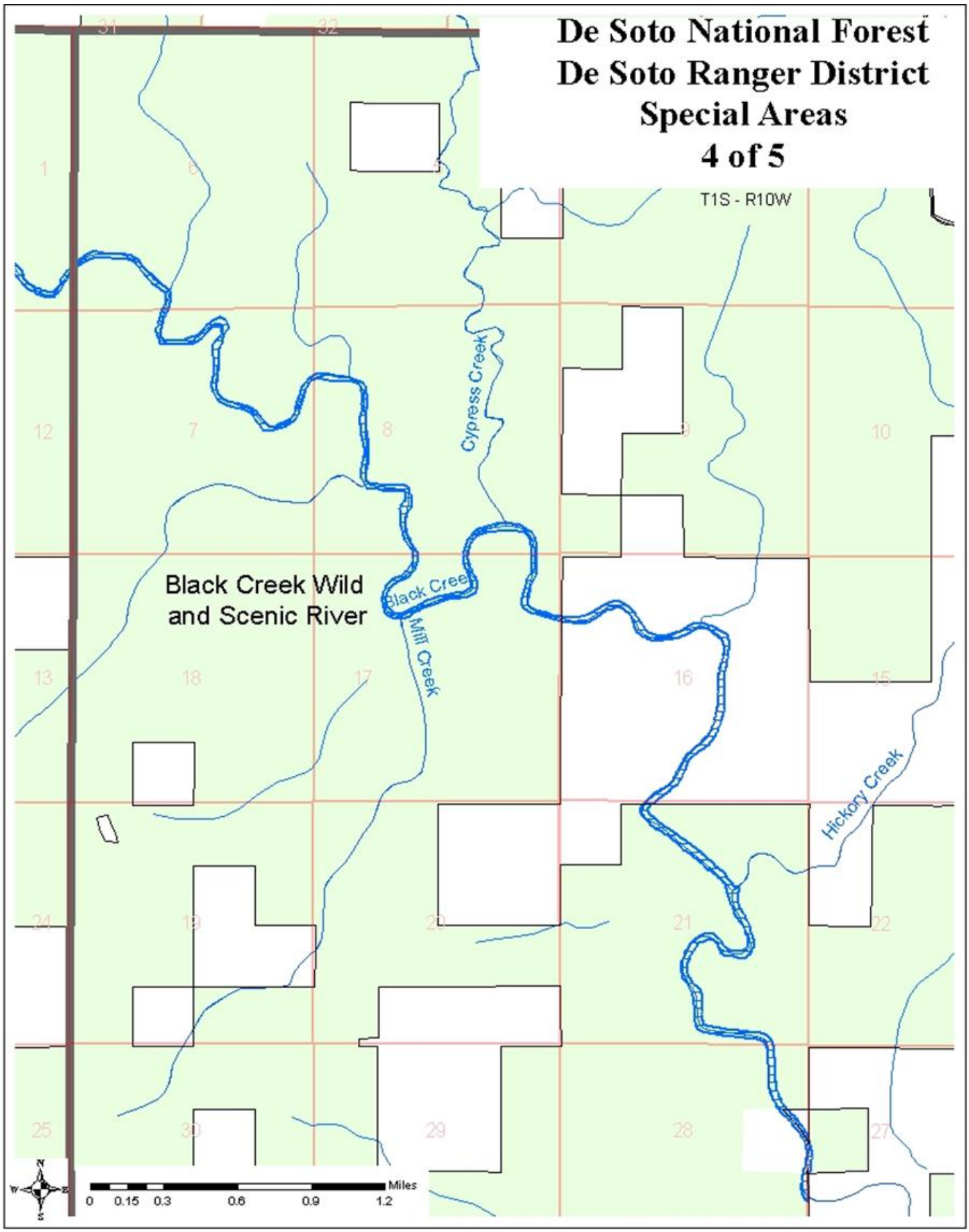


Figure D 11. Black Creek Wild and Scenic River map 4 of 5

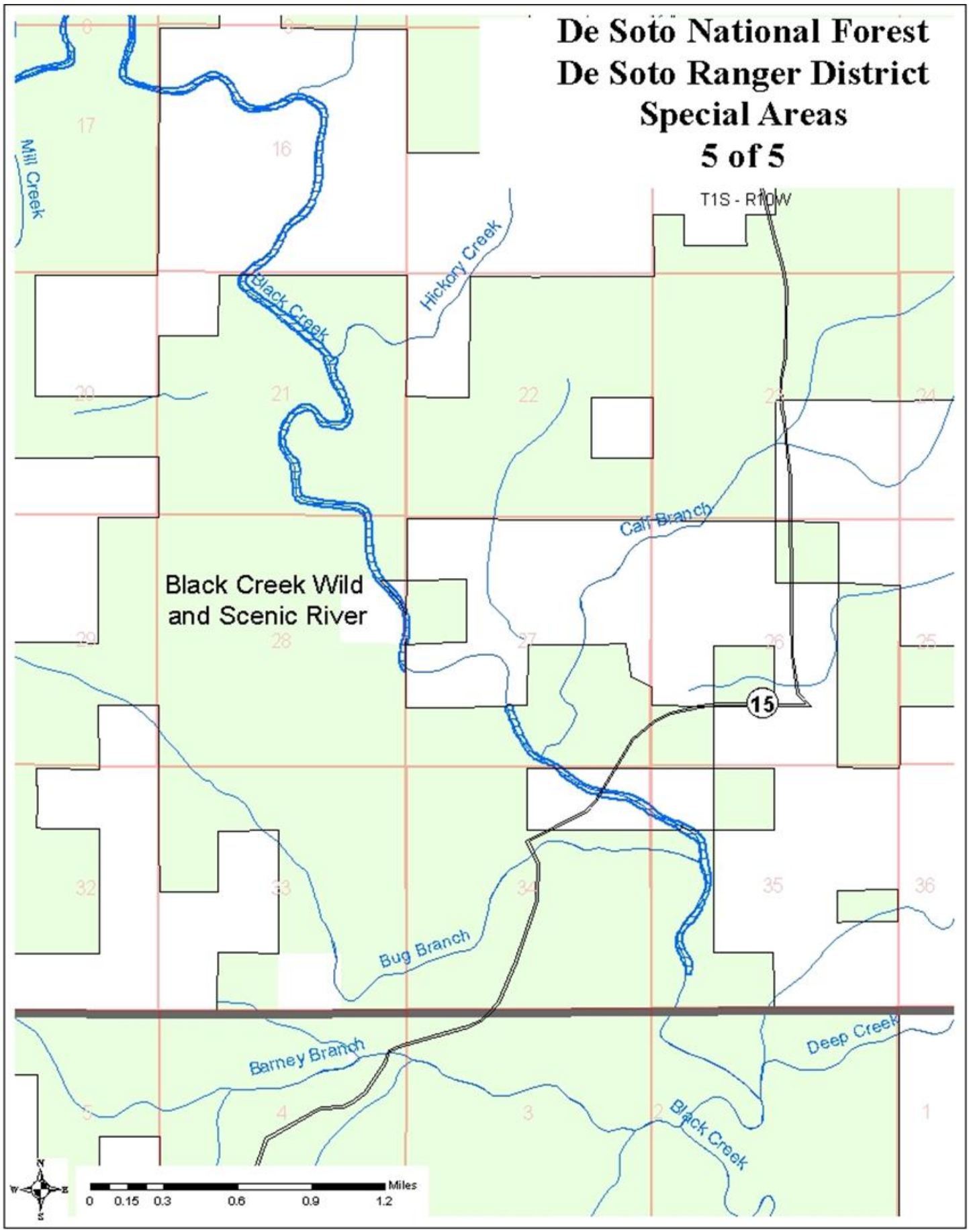


Figure D 12. Black Creek Wild and Scenic River map 5 of 5

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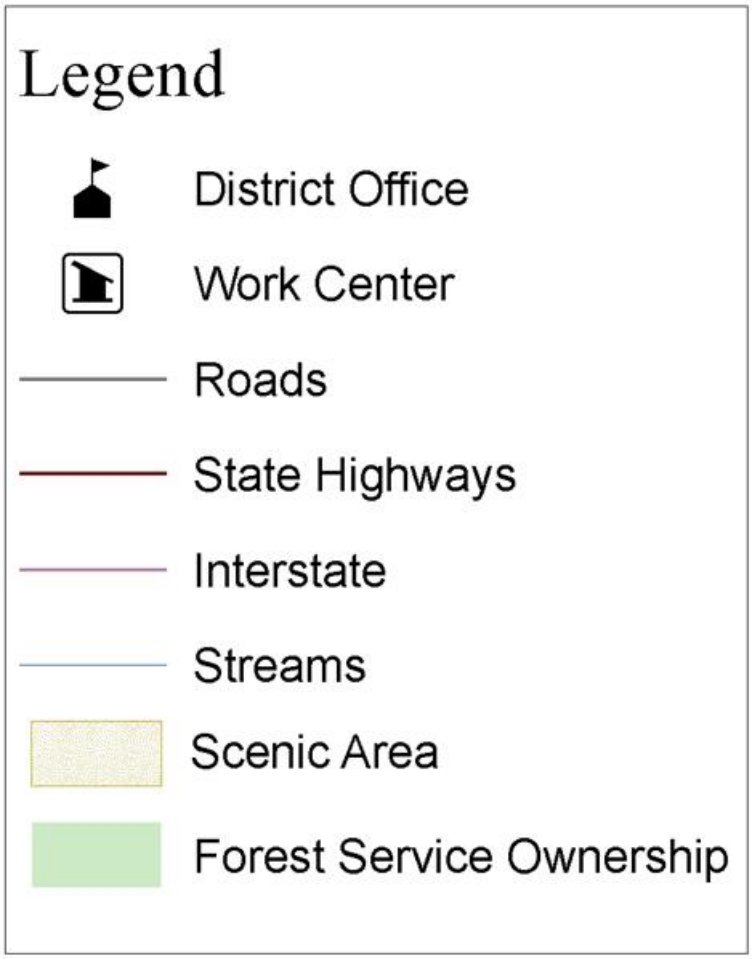
D.2.8 Black Creek Corridor (De Soto Ranger District, De Soto National Forest):

This area consists of a ¼-mile wide corridor on either side of Black Creek, beginning at the Big Creek landing and ending at Alexander Bridge; a distance of about 41 miles. It includes the Black Creek Scenic River and all portions of the corridor are managed the same as the scenic river section.



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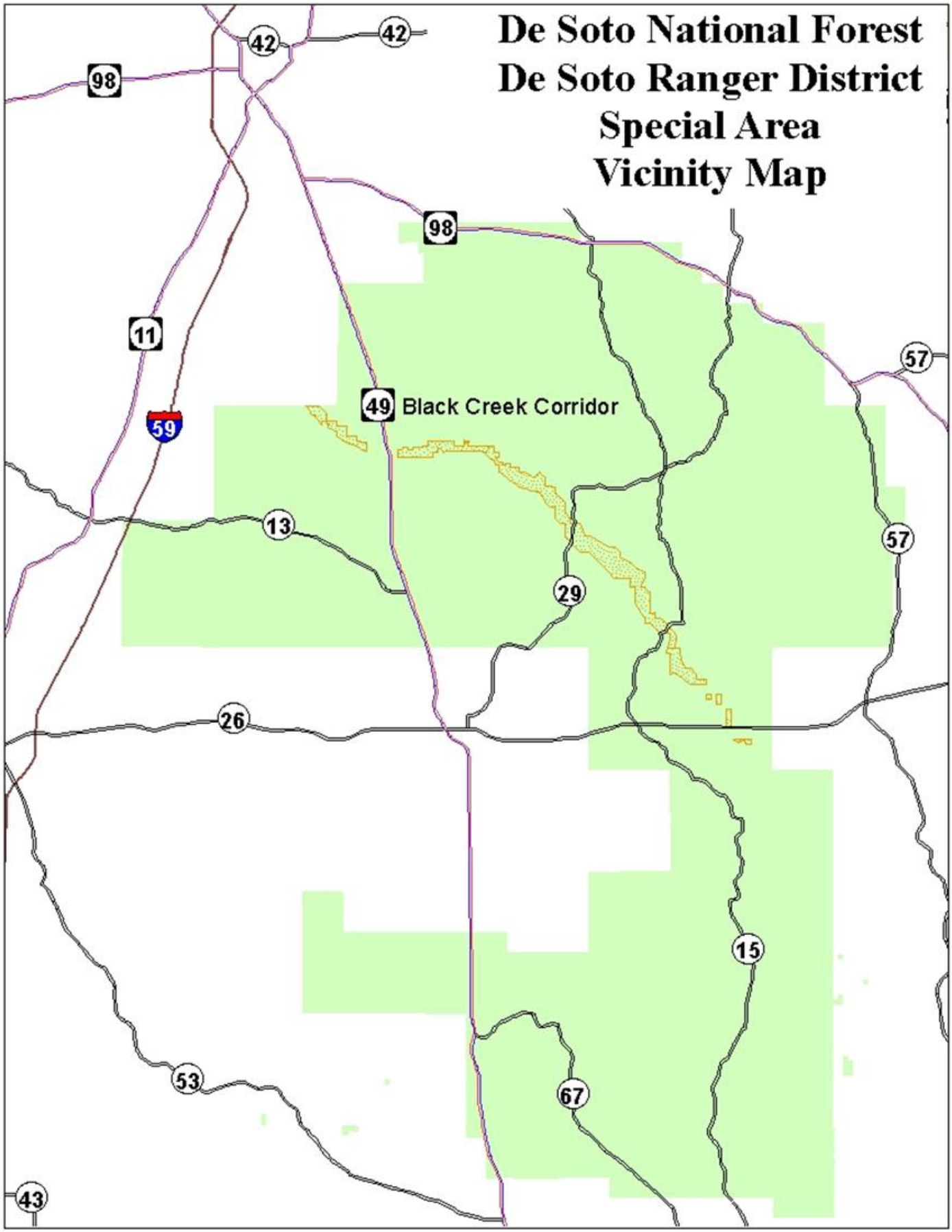


Figure D 13. Vicinity map of the Black Creek Scenic Corridor

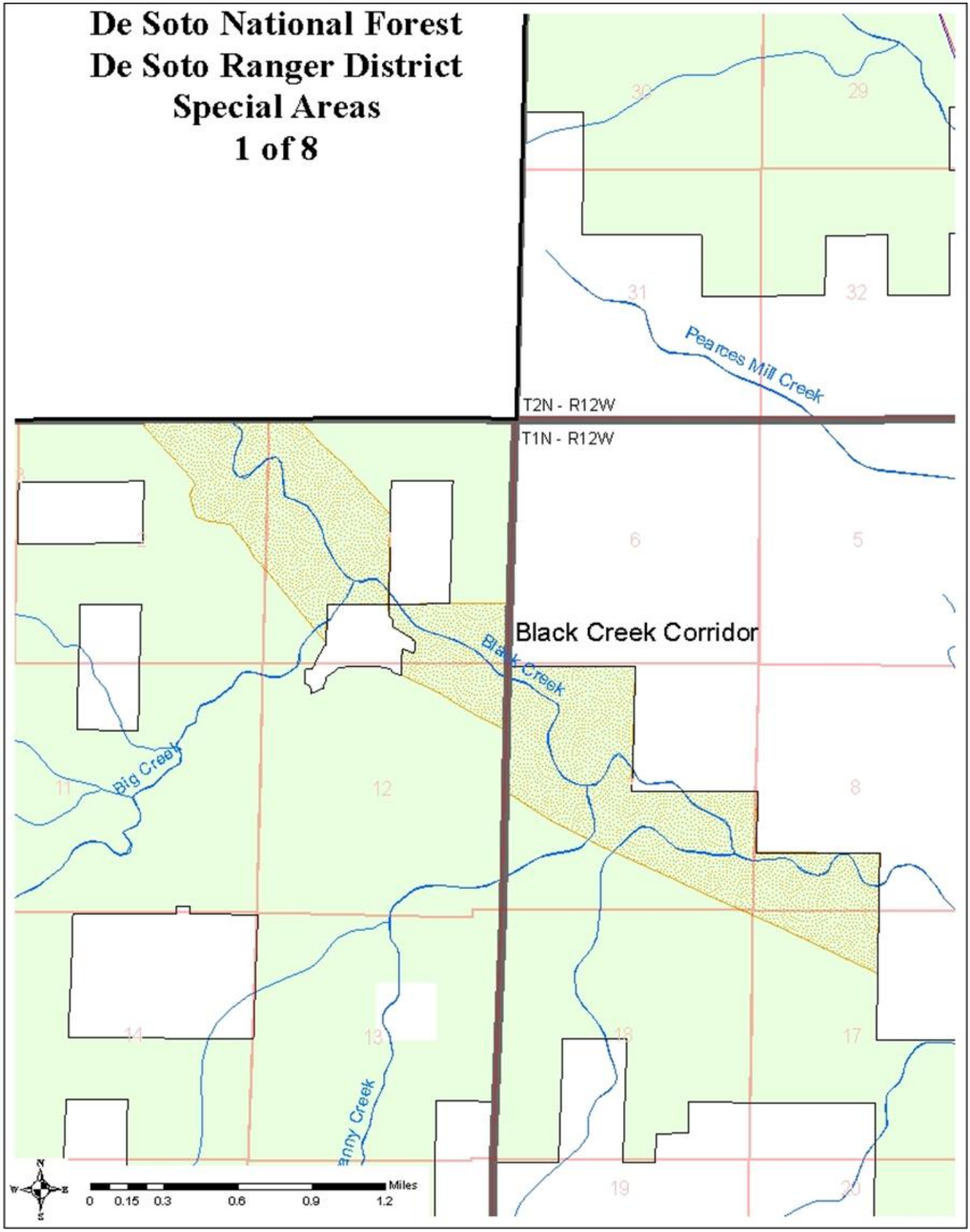


Figure D 14. Black Creek scenic corridor map 1 of 8

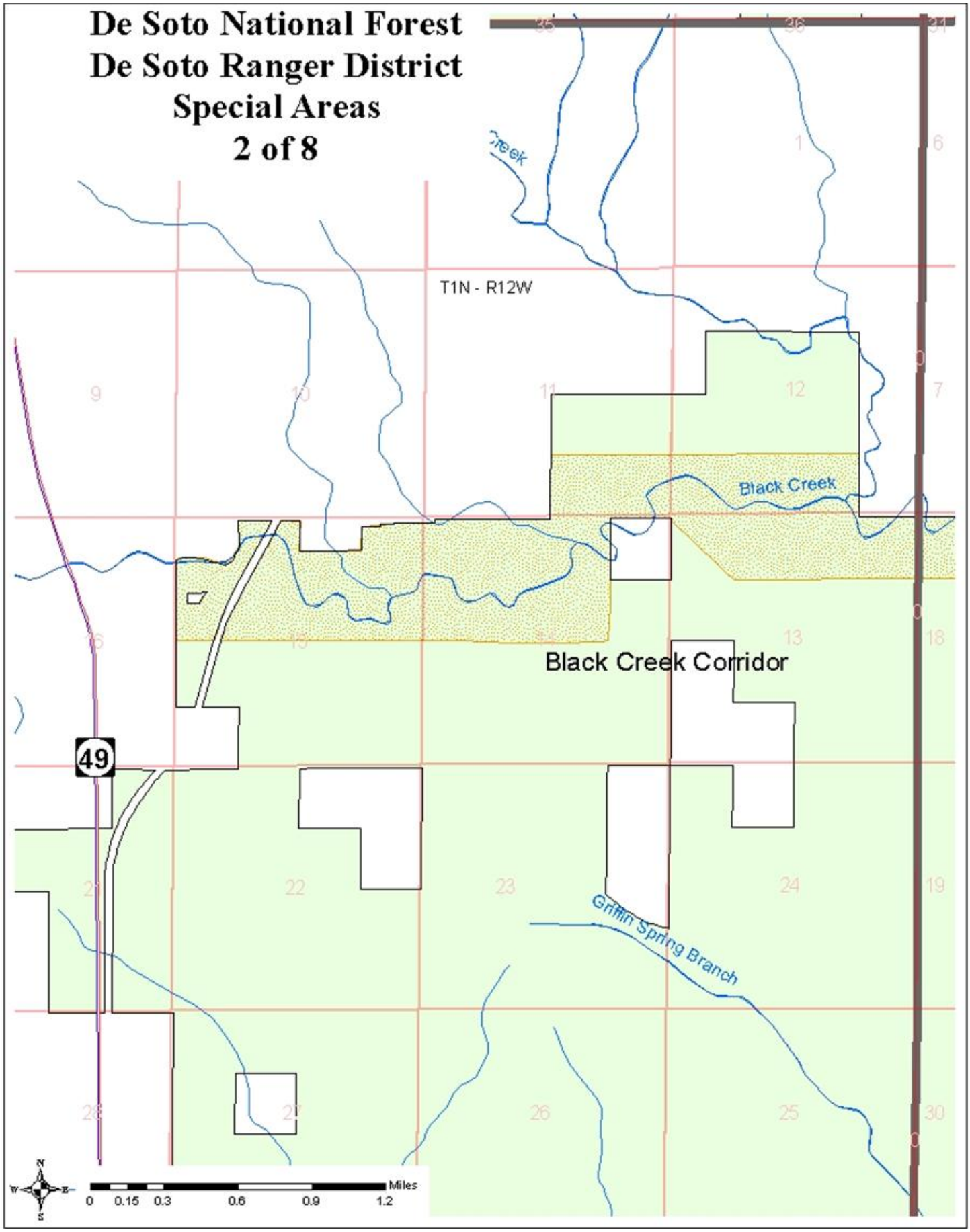


Figure D 15. Black Creek scenic corridor map 2 of 8

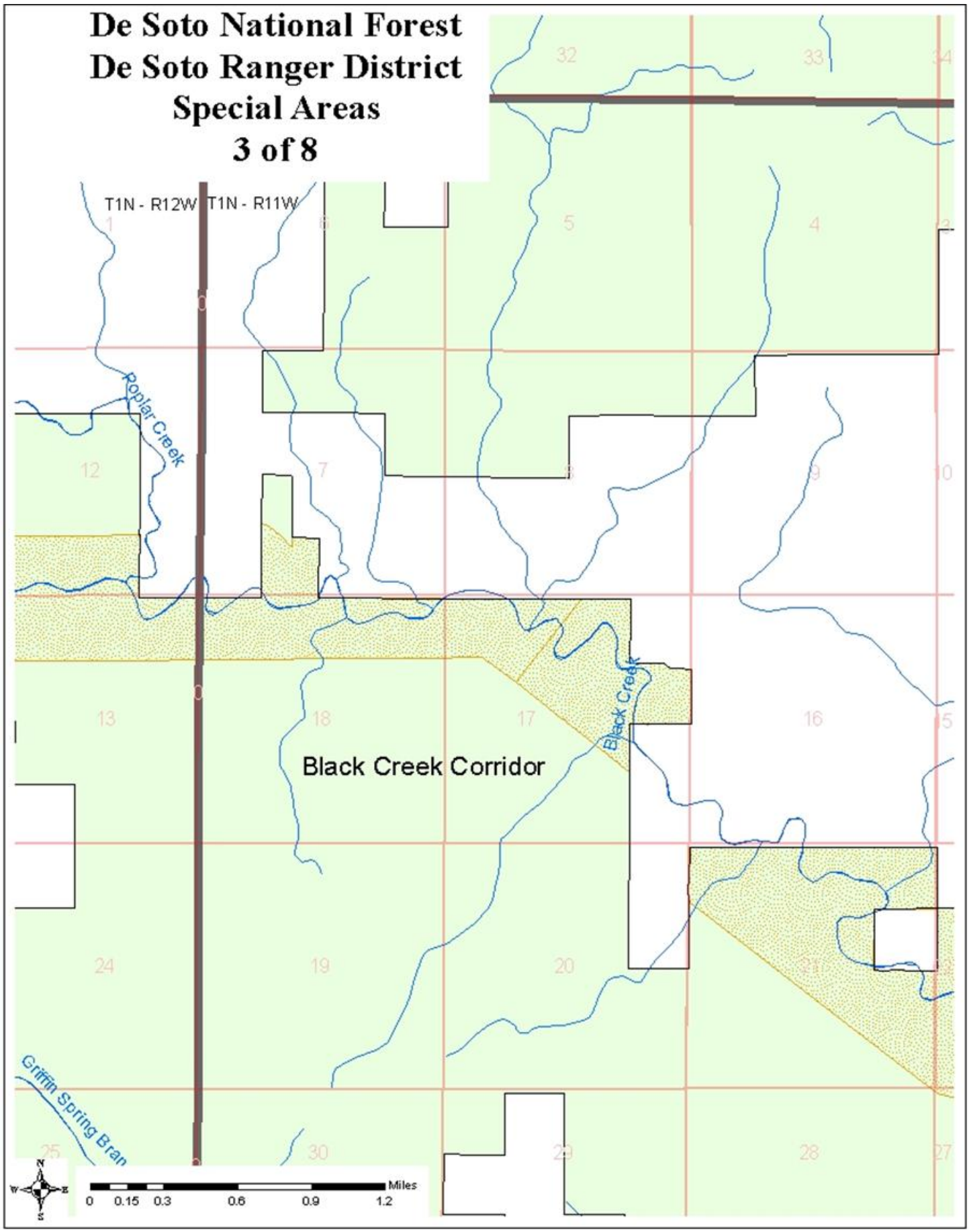


Figure D 16. Black Creek scenic corridor map 3 of 8

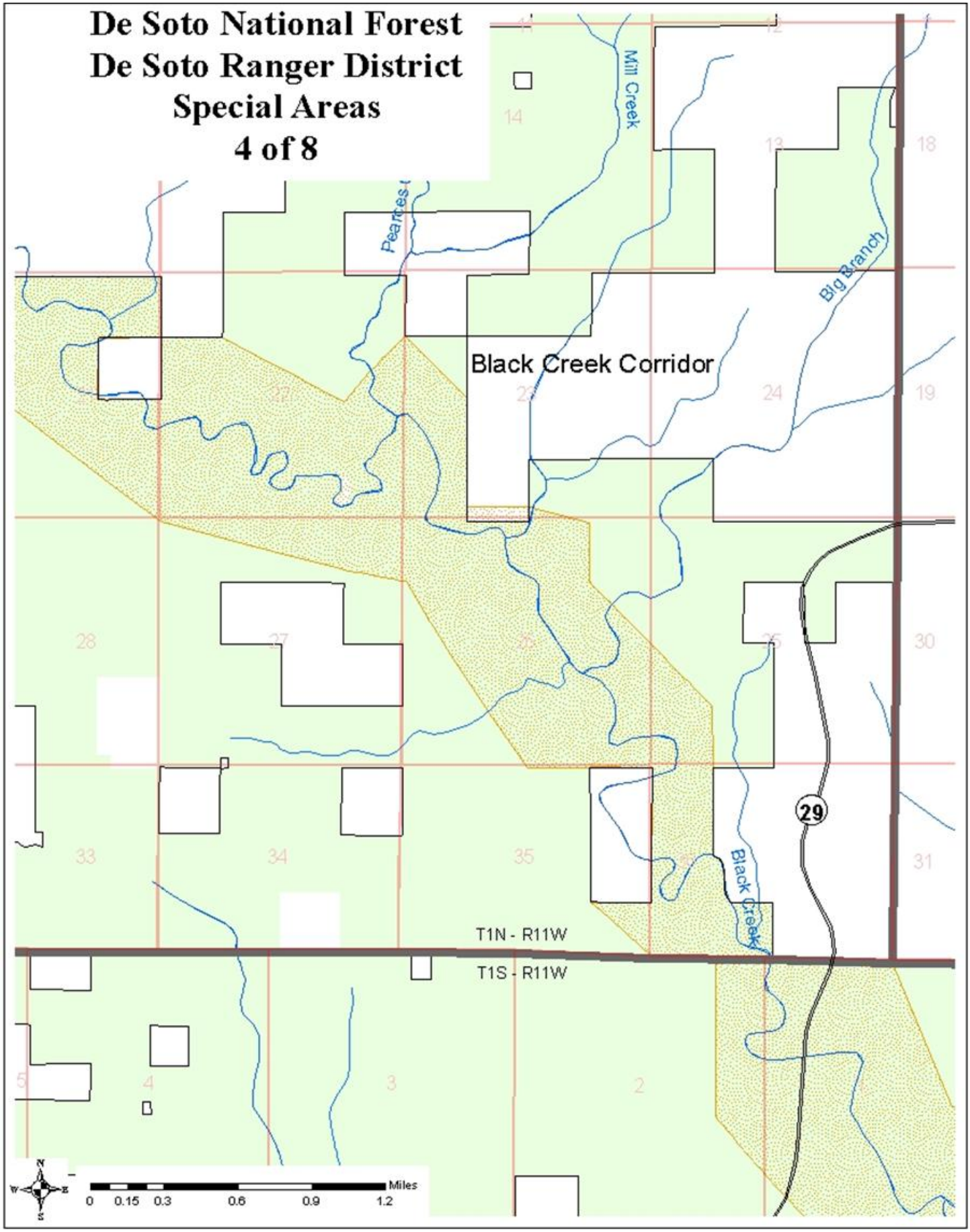


Figure D 17. Black Creek scenic corridor map 4 of 8

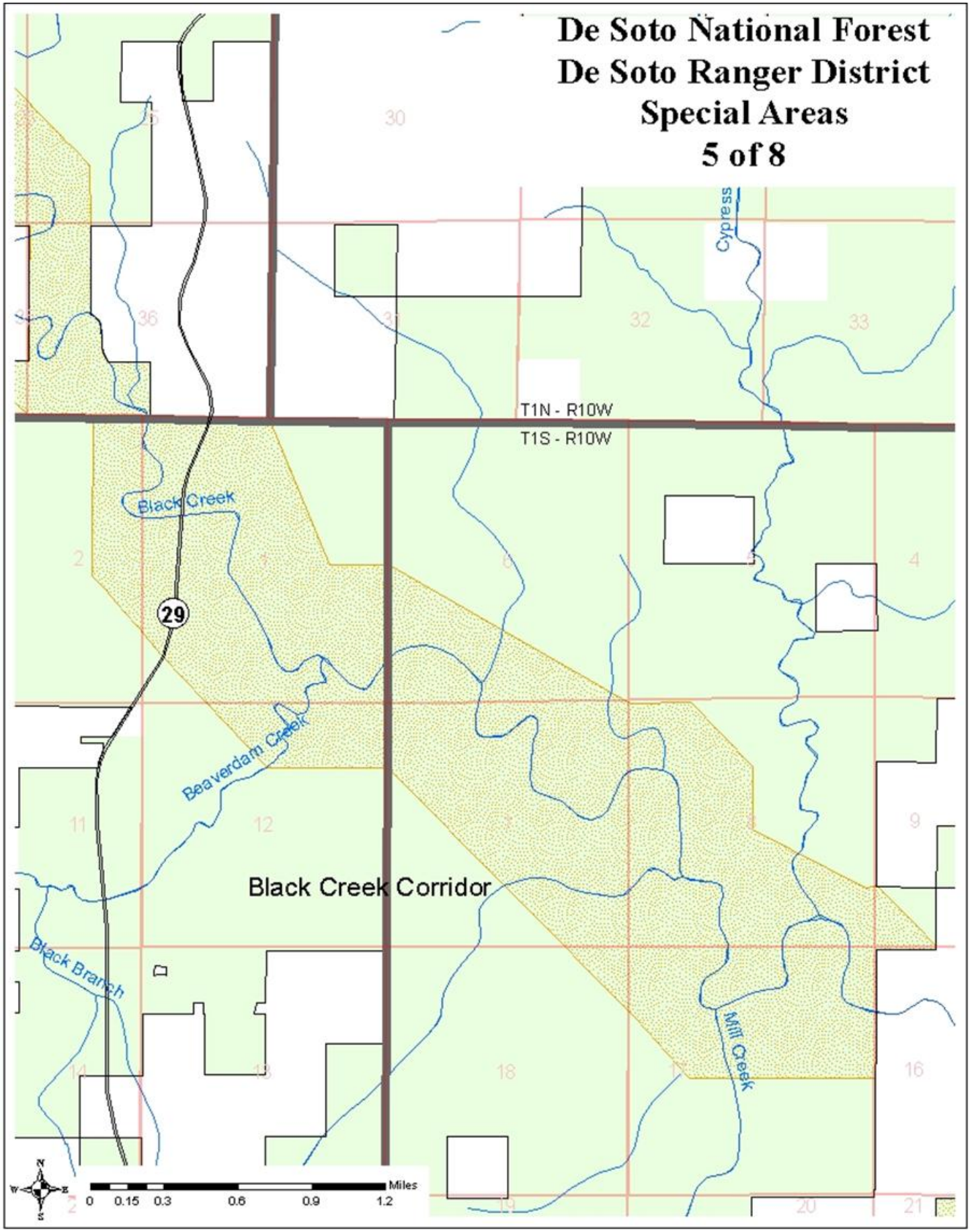


Figure D 18. Black Creek scenic corridor map 5 of 8

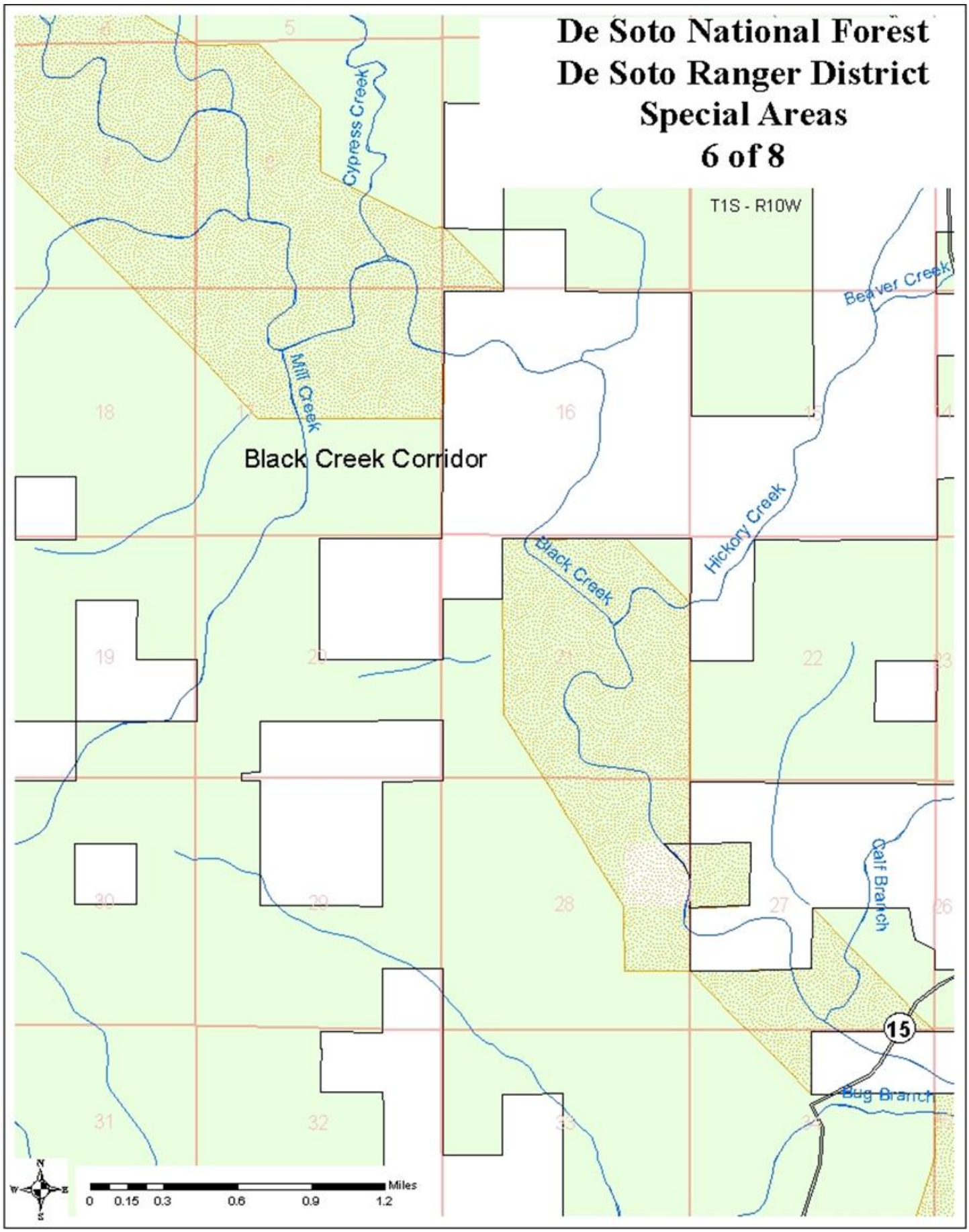


Figure D 19. Black Creek scenic corridor map 6 of 8

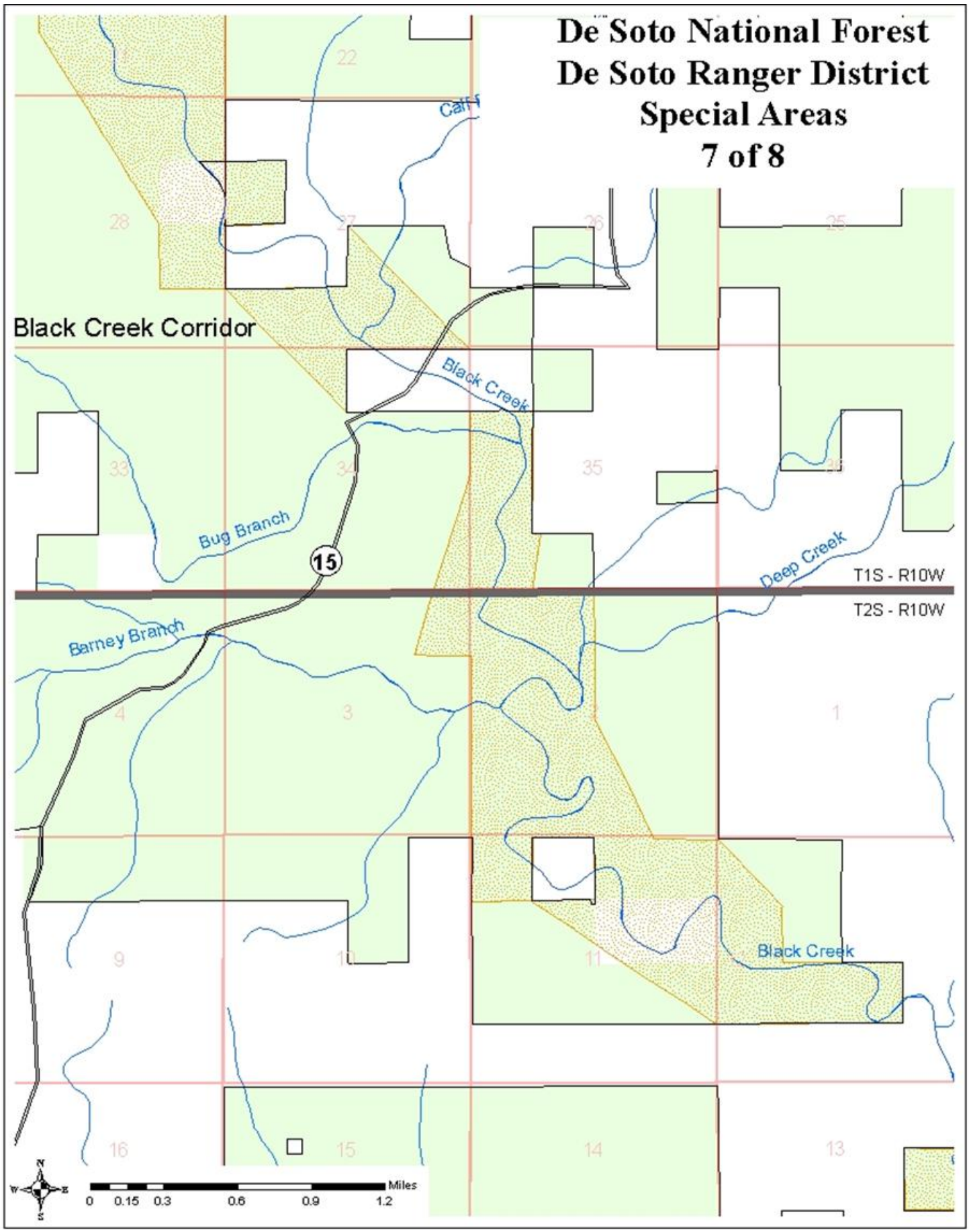


Figure D 20. Black Creek scenic corridor map 7 of 8

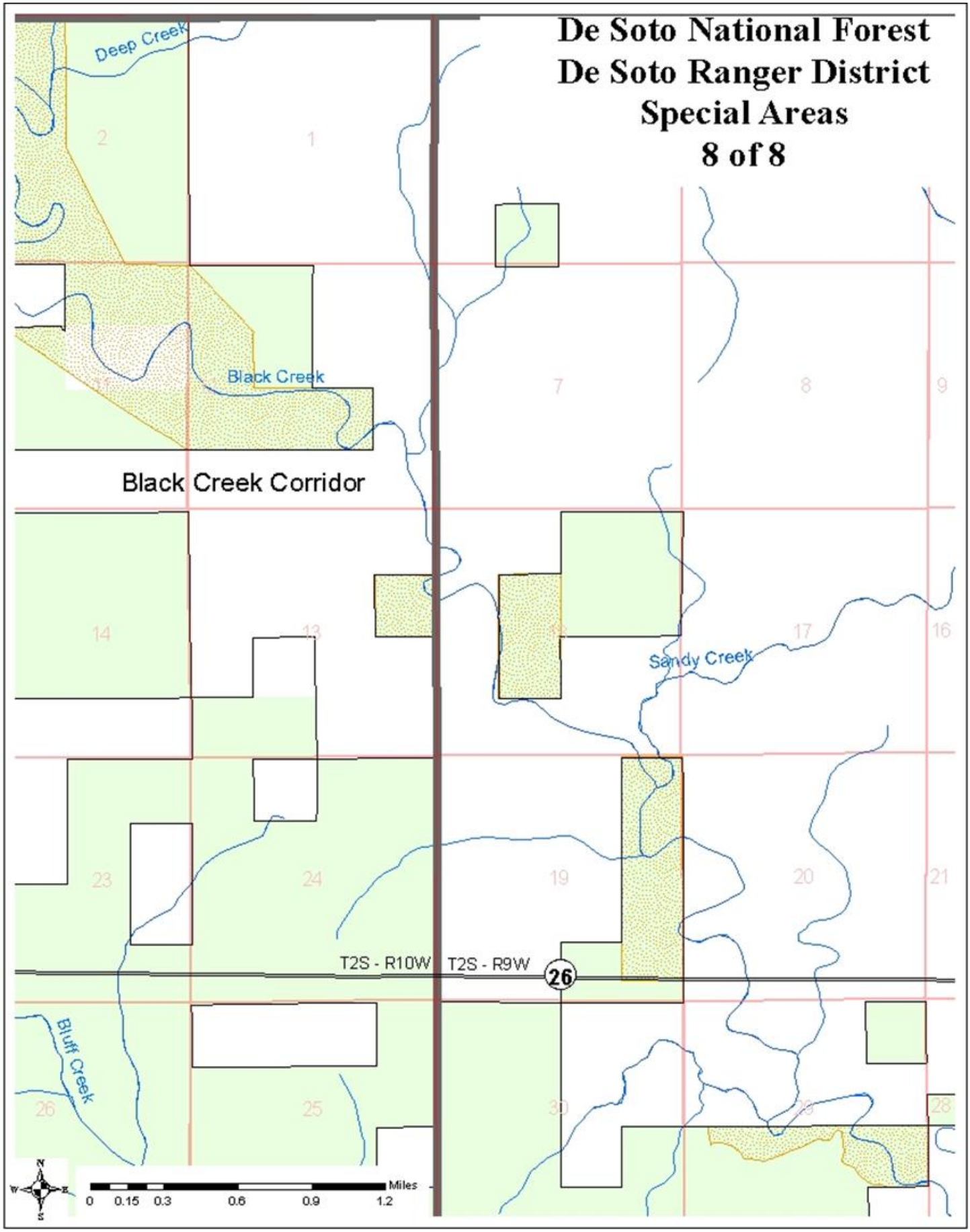
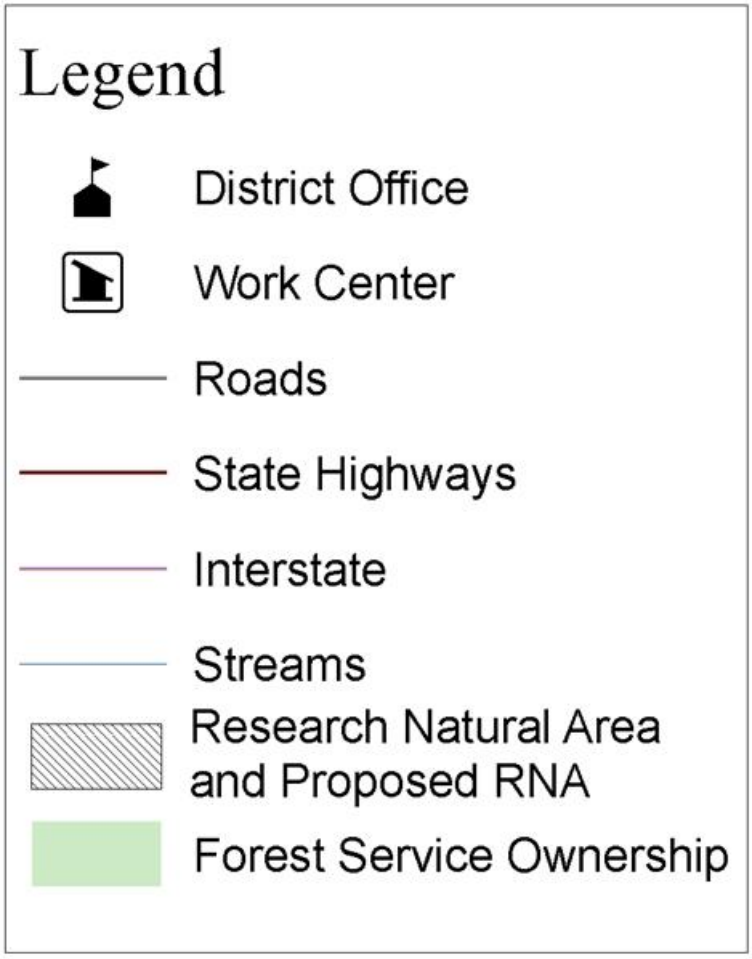


Figure D 21. Black Creek scenic corridor map 8 of 8

D.2.9 Harrison Research Natural Area (De Soto Ranger District, De Soto National Forest):

This area (part of the Harrison Experimental Forest) contains an extensive and high quality xeric longleaf pine forest with saw palmetto and other characteristic species. The sand ridge is surrounded by more typical mesic longleaf forest and several drainages. This xeric sandhill community remains a healthy example of its type. As an established research natural area, this area provides undisturbed base line areas to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community it serves as an area in which natural biological diversity is conserved.



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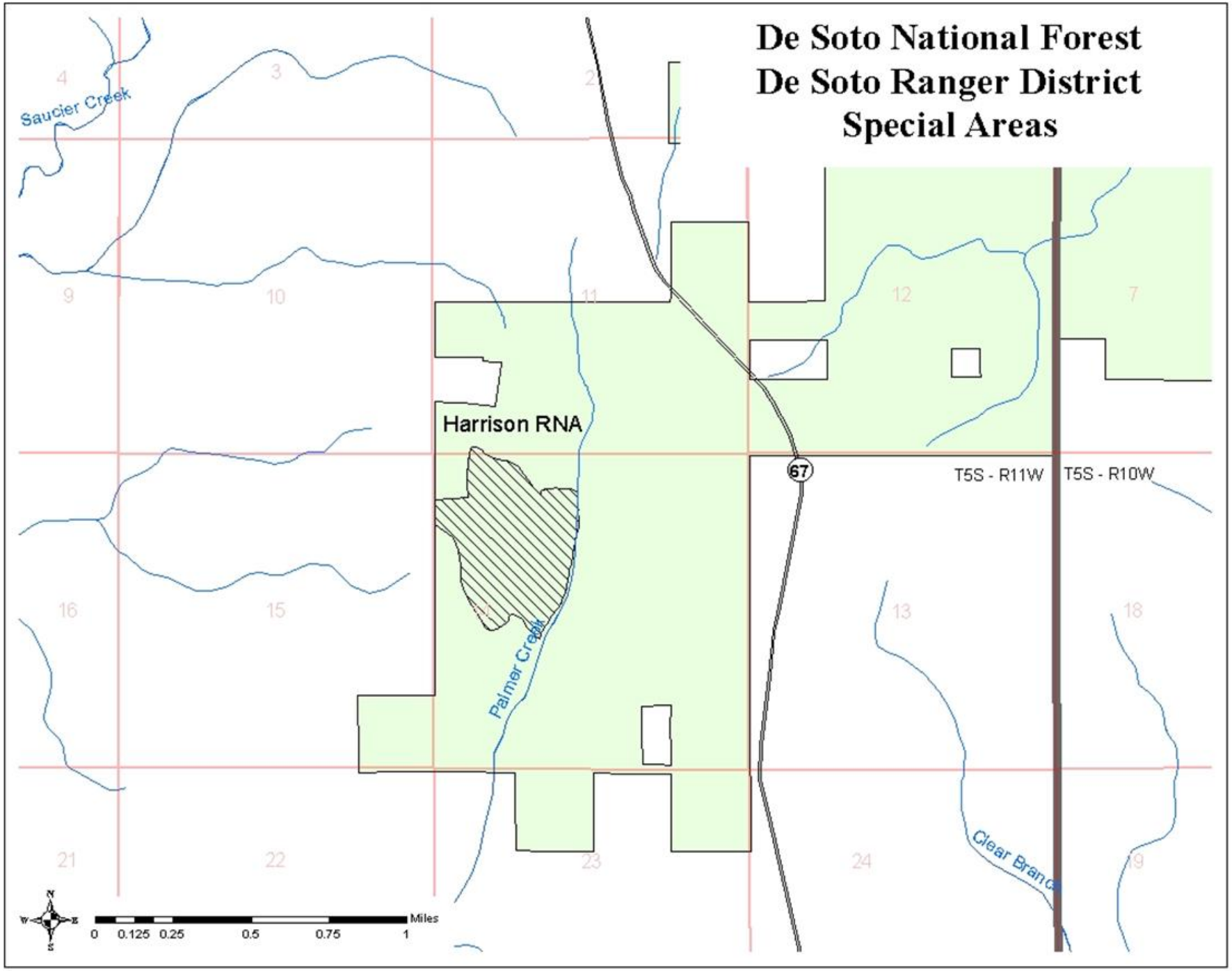
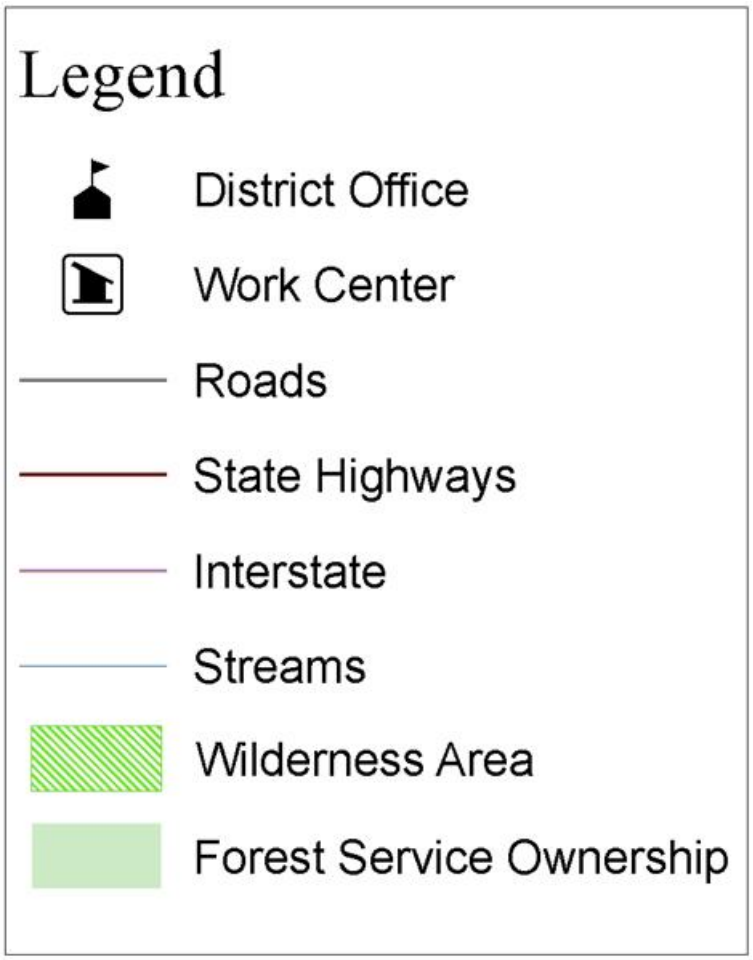


Figure D 22. Map of Harrison Research Natural Area

D.2.10 Black Creek Wilderness Area (De Soto Ranger District, De Soto National Forest):

The Black Creek Wilderness (5,052 acres) is named after its dominant feature—Black Creek, which bisects the wilderness, creating a large hardwood floodplain containing oxbow lakes and stands of sweet gum, loblolly pine, spruce pine, willow oak, bald cypress, sweet bay and red maple. Under provisions of the Clean Air Act, this wilderness is classified as a Class II area, the same as all other National Forest System land in Mississippi.

Most of the Black Creek Wilderness occupies part of the broad valley of Black Creek. Relief is fairly gentle with elevations ranging from 100 to 130 feet above sea level within the creek valley, and up to 270 feet above sea level on the adjoining uplands. This area is predominately pine and pine hardwood, with hardwoods along the drainages. The Black Creek Wilderness is potential habitat for the federally endangered Louisiana black bear. The only development in the area is the Black Creek Trail; no other facilities are provided. This area offers semi-primitive recreation opportunities and moderate levels of solitude.



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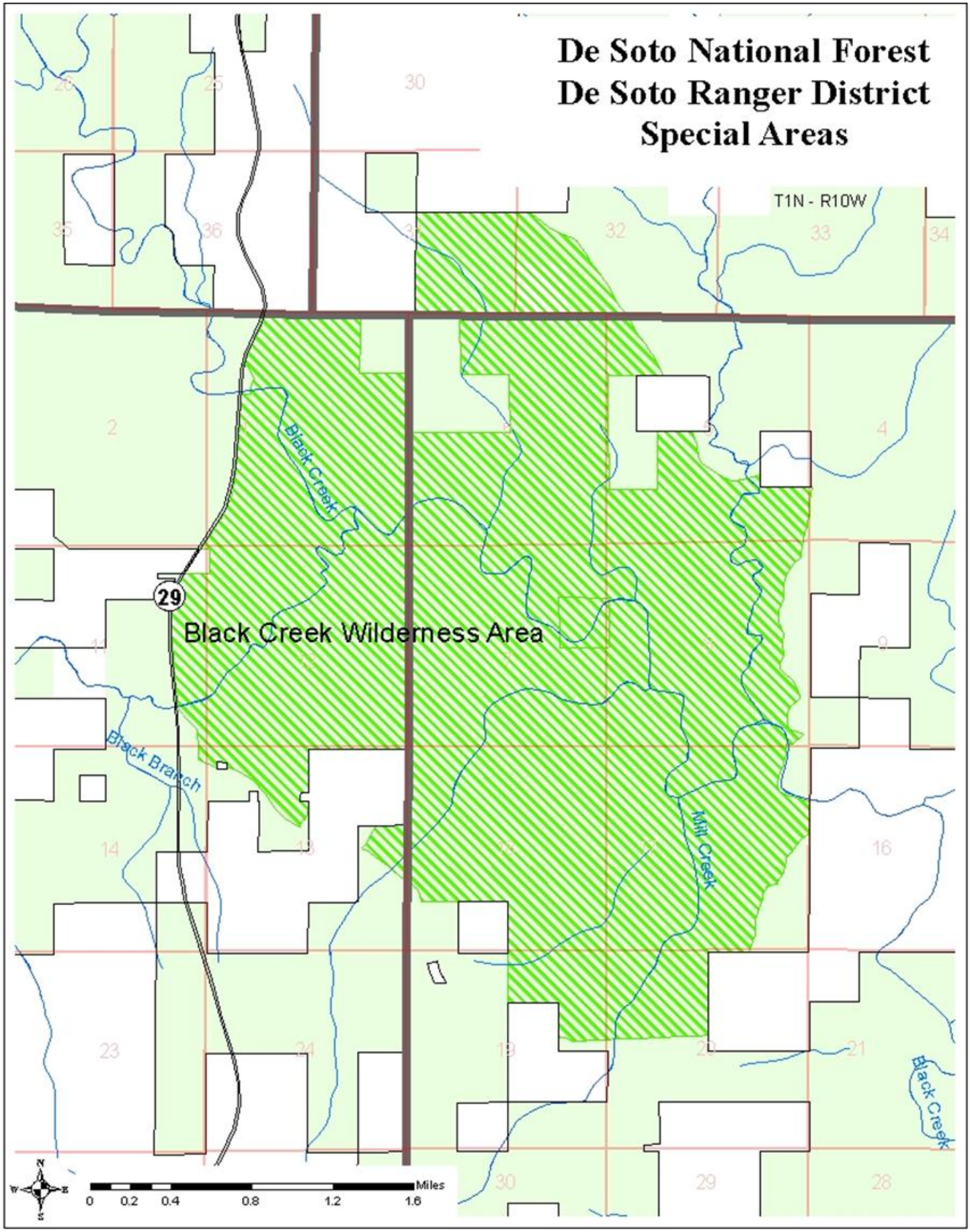
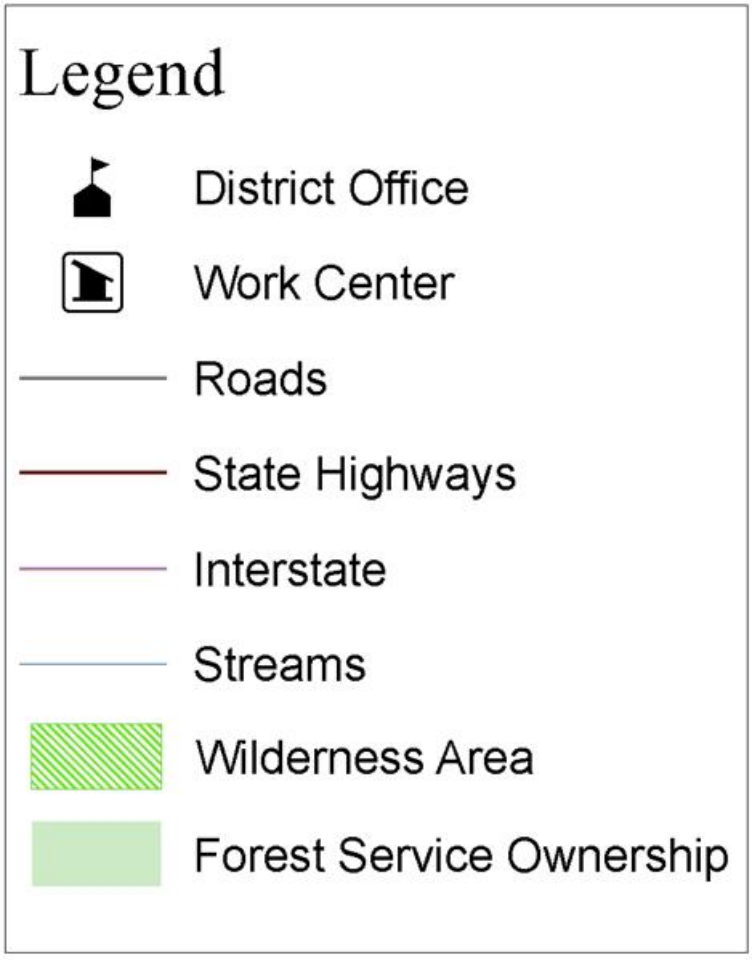


Figure D 23. Map of Black Creek Wilderness Area

D.2.11 Leaf Wilderness Area (De Soto Ranger District, De Soto National Forest):

The Leaf Wilderness (994 acres) lies almost entirely on the floodplain of the west-to-east flowing Leaf River. Except for a small upland area on the extreme western edge of the wilderness, the area primarily consists of meandering sloughs, oxbow lakes and level terrain with spruce-pine forest or oak-gum-cypress river bottom types. The upland is covered in loblolly and shortleaf pines. Elevations average 50 feet mean sea level. The Leaf Wilderness Area offers semi-primitive recreation opportunities and moderate levels of solitude.

Black Creek Wilderness and Leaf Wilderness are the only two designated wilderness areas in the National Forests in Mississippi. Both the Black Creek and Leaf Wilderness Areas (along with the Black Creek Wild and Scenic River Corridor) were studied in depth during an extensive "limits of acceptable change" analysis completed in April 1994.



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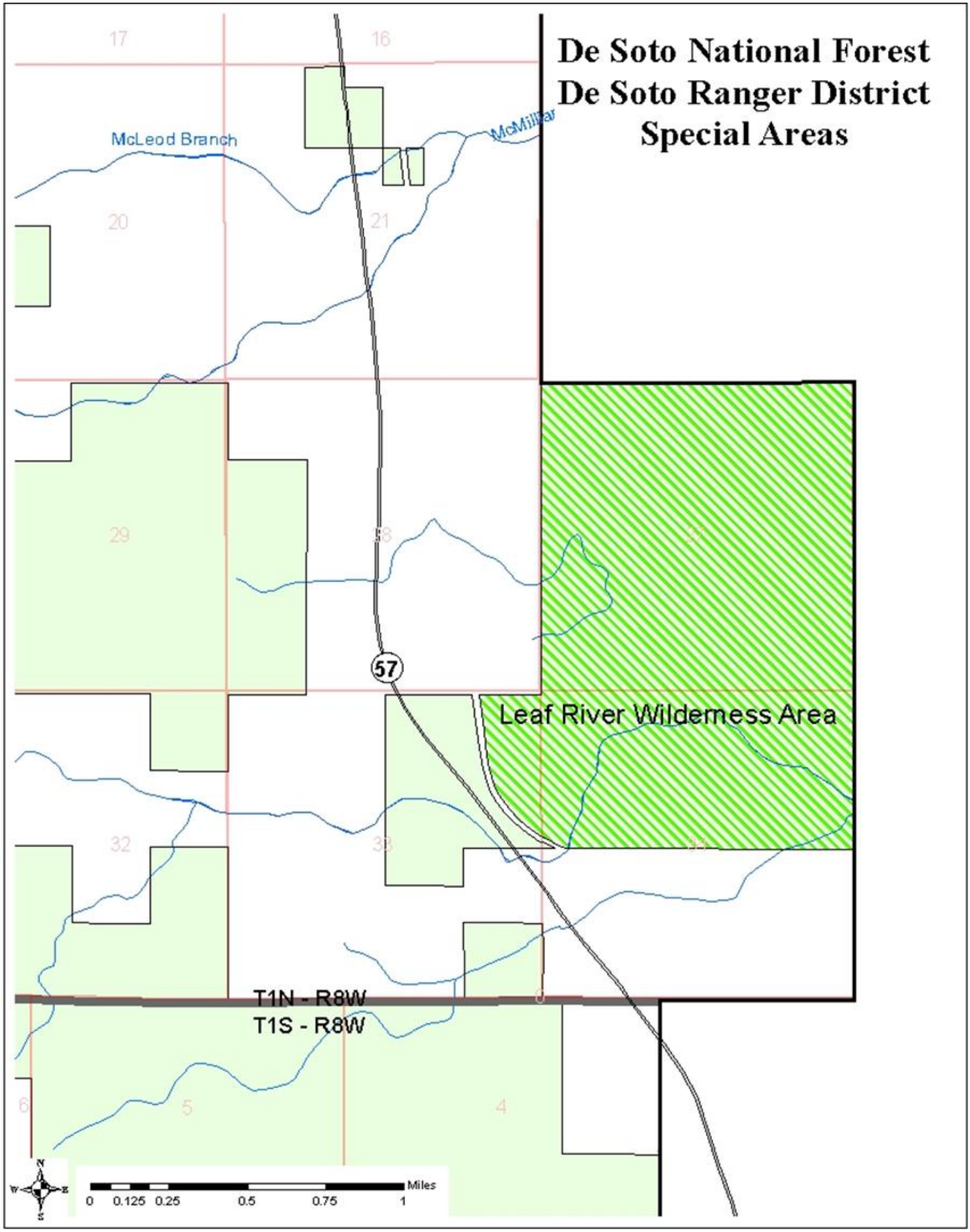
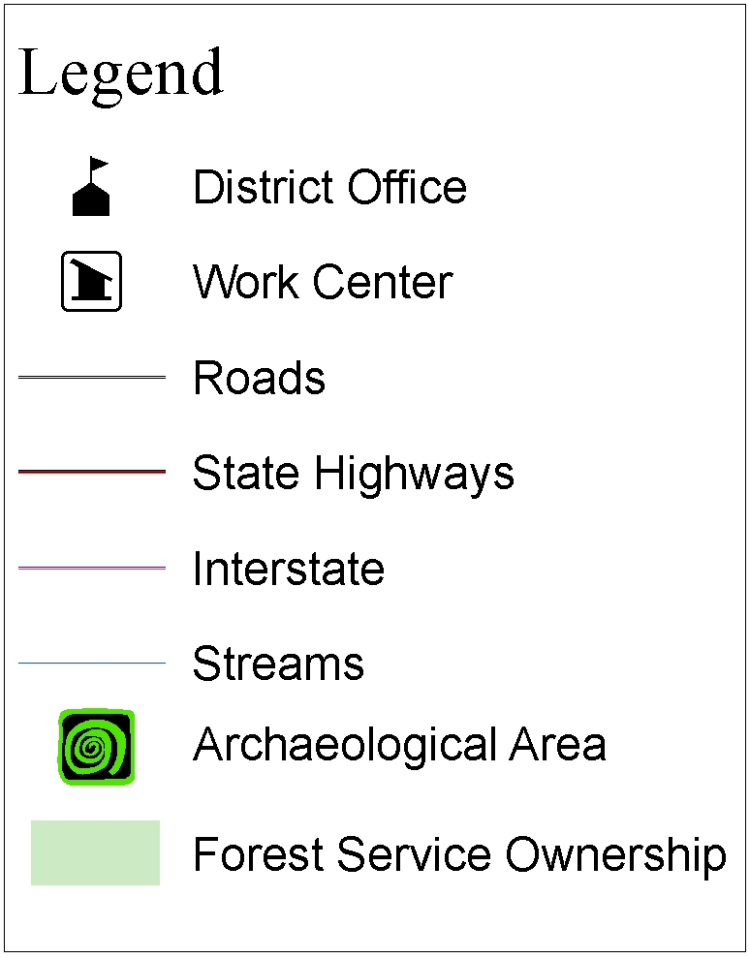


Figure D 24. Map of Leaf Wilderness Area

D.2.12 Dowling Bayou Archaeological Site (Delta National Forest):

Dowling Bayou Archaeological Site is an Indian mound and village site on the Delta National Forest. It dates from the late woodland period (A.D. 800) and is a classic example of the mounds of this period. The cultural resources are protected and available for research.



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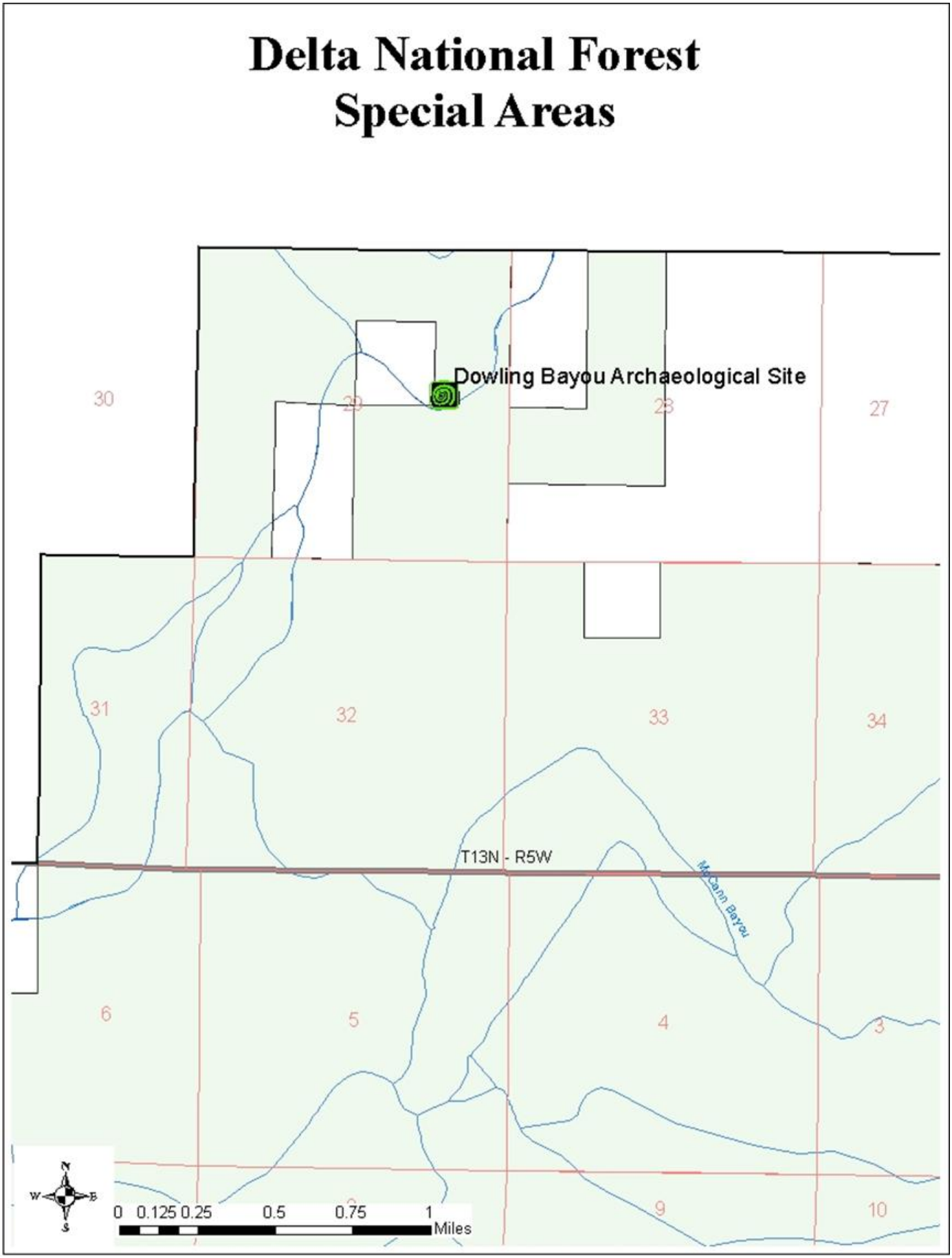
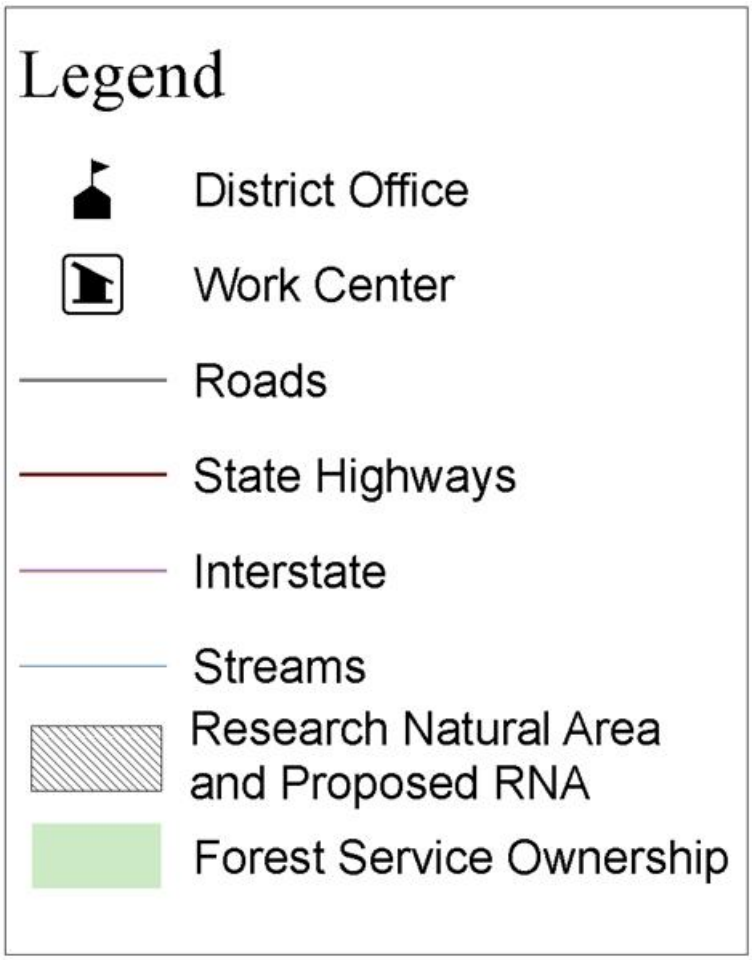


Figure D 25. Map of Dowling Bayou Archaeological Site

D.2.13 Red Gum Research Natural Area (Delta National Forest):

The Red Gum Research Natural Area is a stand of huge sweet gum trees, some of them over 300 years old. This is a “ridge bottom” delta forest with dense understory of dwarf palmetto and switchcane. This relatively undisturbed Mississippi River Delta bottomland hardwood forest has never been logged.

This example of Mississippi River bottomland hardwood forest is intact and properly functioning hydrologically. As an established research natural area, this area provides undisturbed base line sites on which to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community it serves as an area in which natural biological diversity is conserved.



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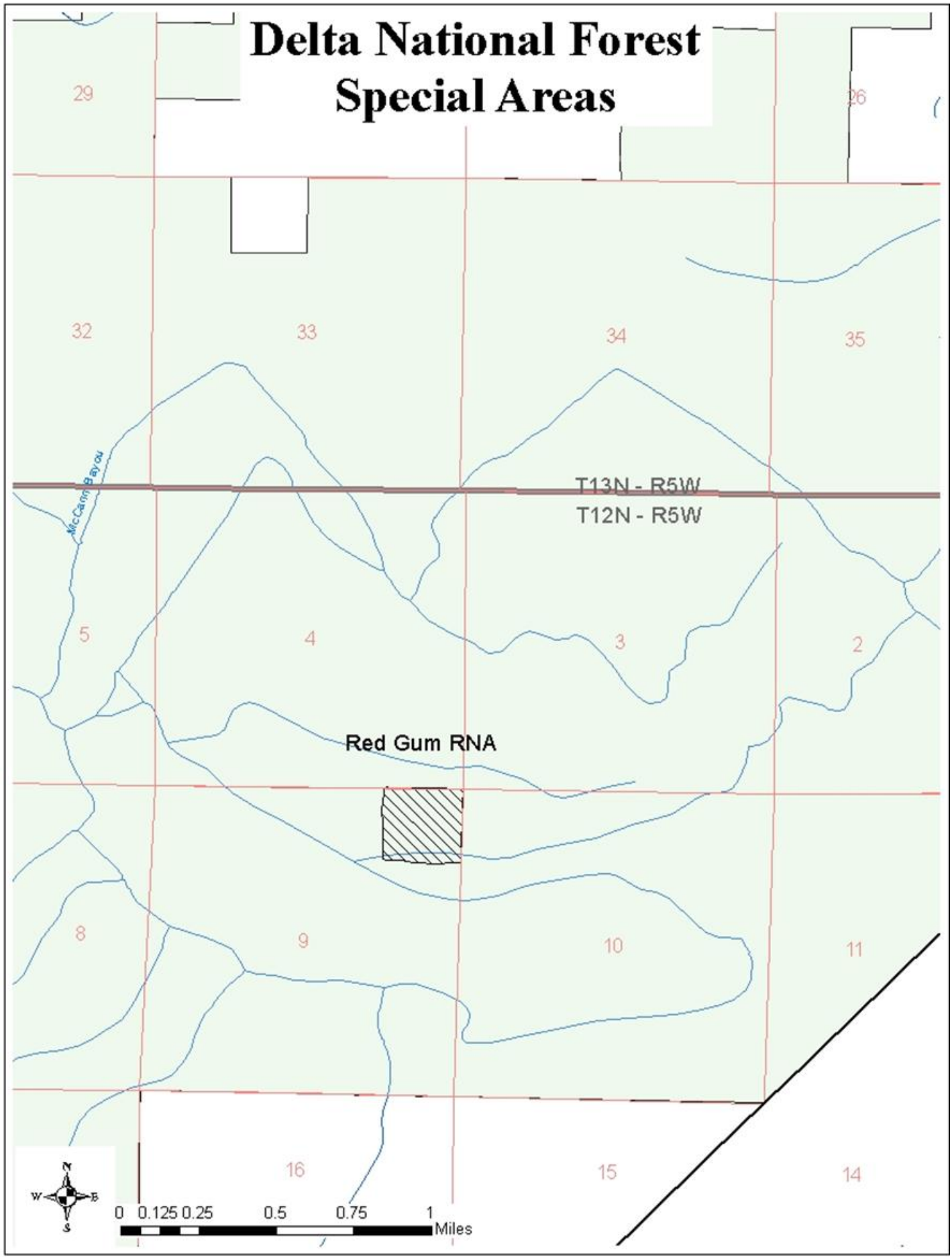
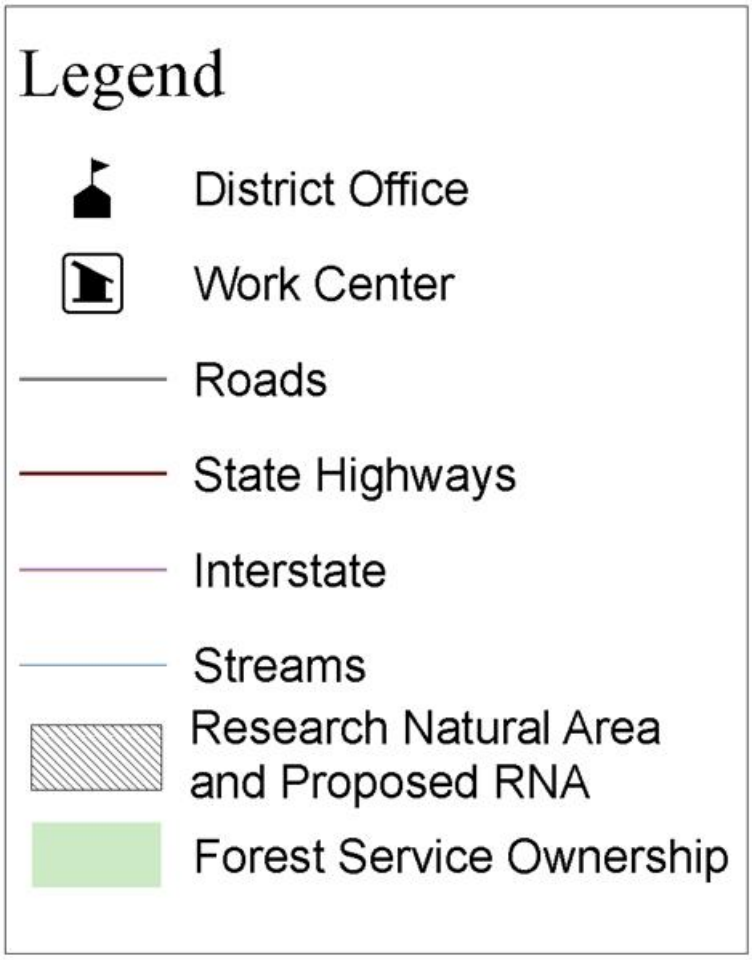


Figure D 26. Map of Redgum Research Natural Area

D.2.14 Overcup Oak – Water Hickory Research Natural Area (Delta National Forest):

The Overcup Oak – Water Hickory Research Natural Area is remnant of virgin bottomland forest in the Mississippi River Delta Region. The forest is dominated by large overcup oaks and water hickories estimated to be about 200 years old. This example of Mississippi River bottomland hardwood forest is intact and properly functioning hydrologically. As an established research natural area, this area provides undisturbed base line sites on which to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community it serves as an area in which natural biological diversity is conserved.



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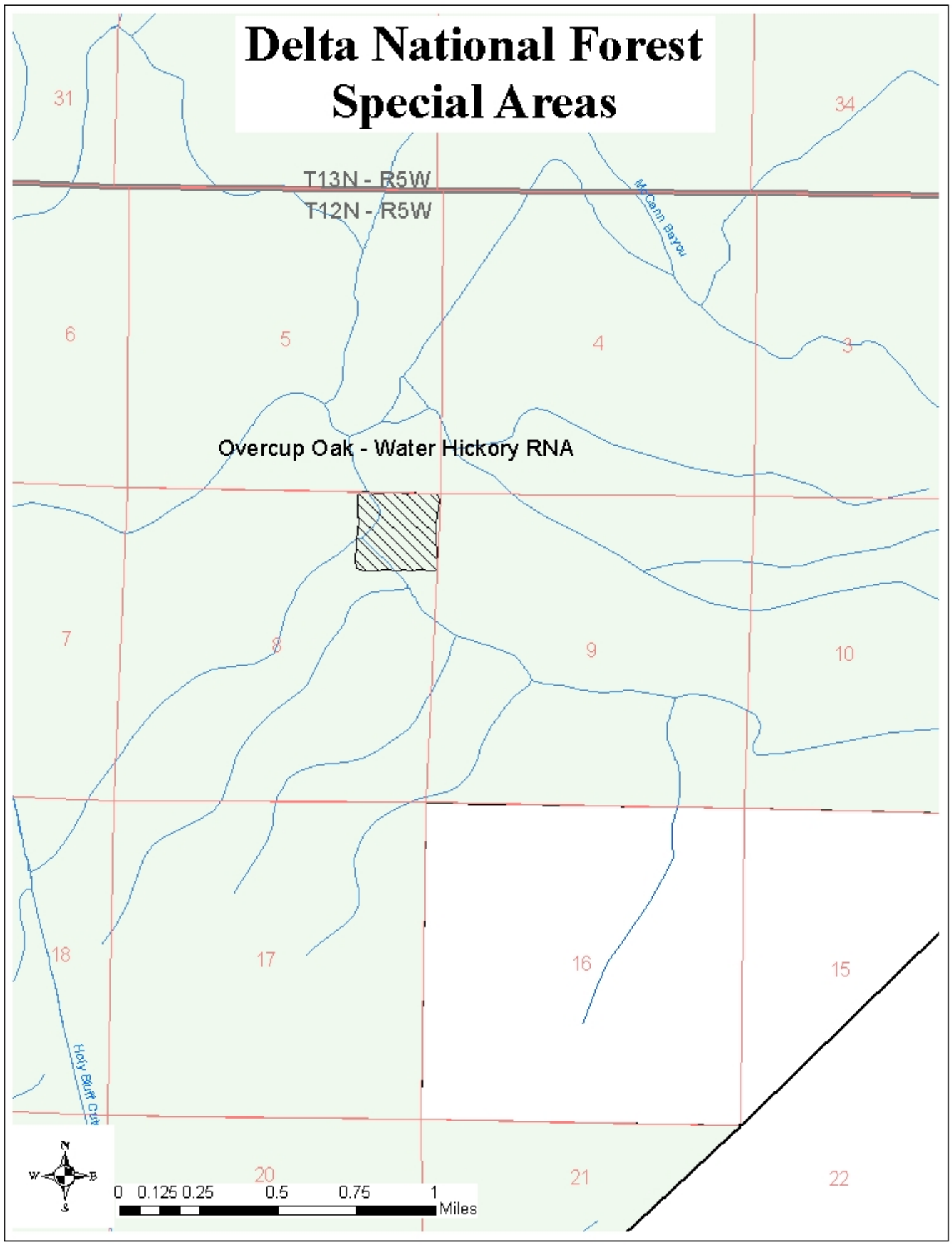
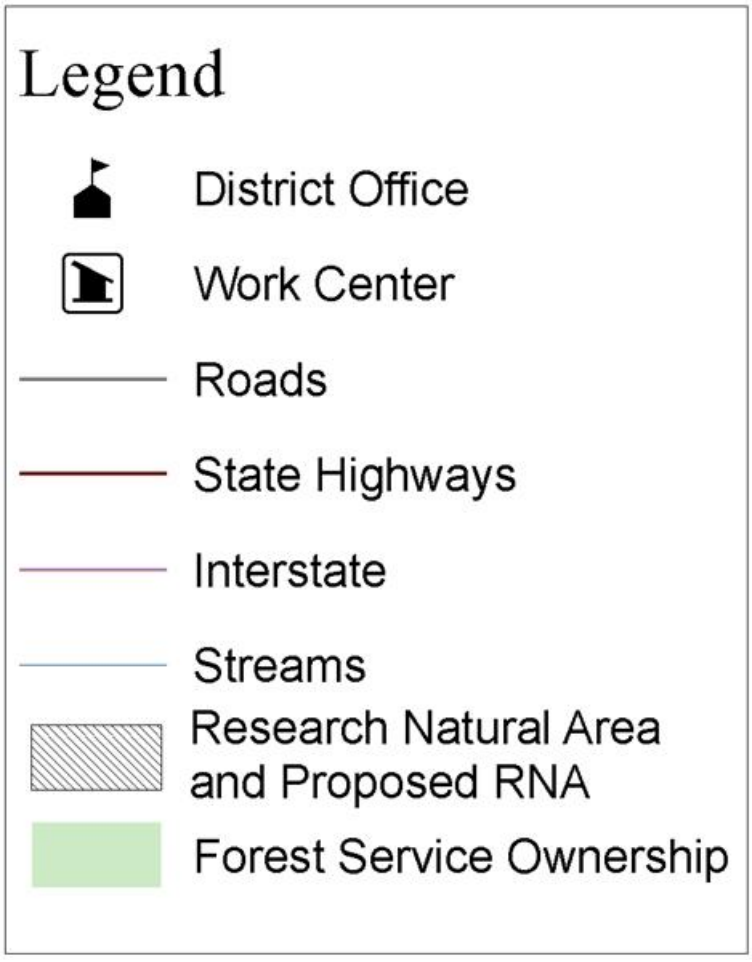


Figure D 27. Map of Overcup Oak - Water Hickory Research Natural Area

D.2.15 Green Ash – Sugarberry Research Natural Area (Delta National Forest):

The Green Ash – Sugarberry Research Natural Area is a remnant of the virgin bottomland hardwood forest that once covered the Mississippi River Delta. The research natural area has huge green ash trees that are in excess of 250 years old. This example of Mississippi River bottomland hardwood forest is intact and properly functioning hydrologically. As an established research natural area, this area provides undisturbed base line sites on which to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community it serves as an area in which natural biological diversity is conserved.



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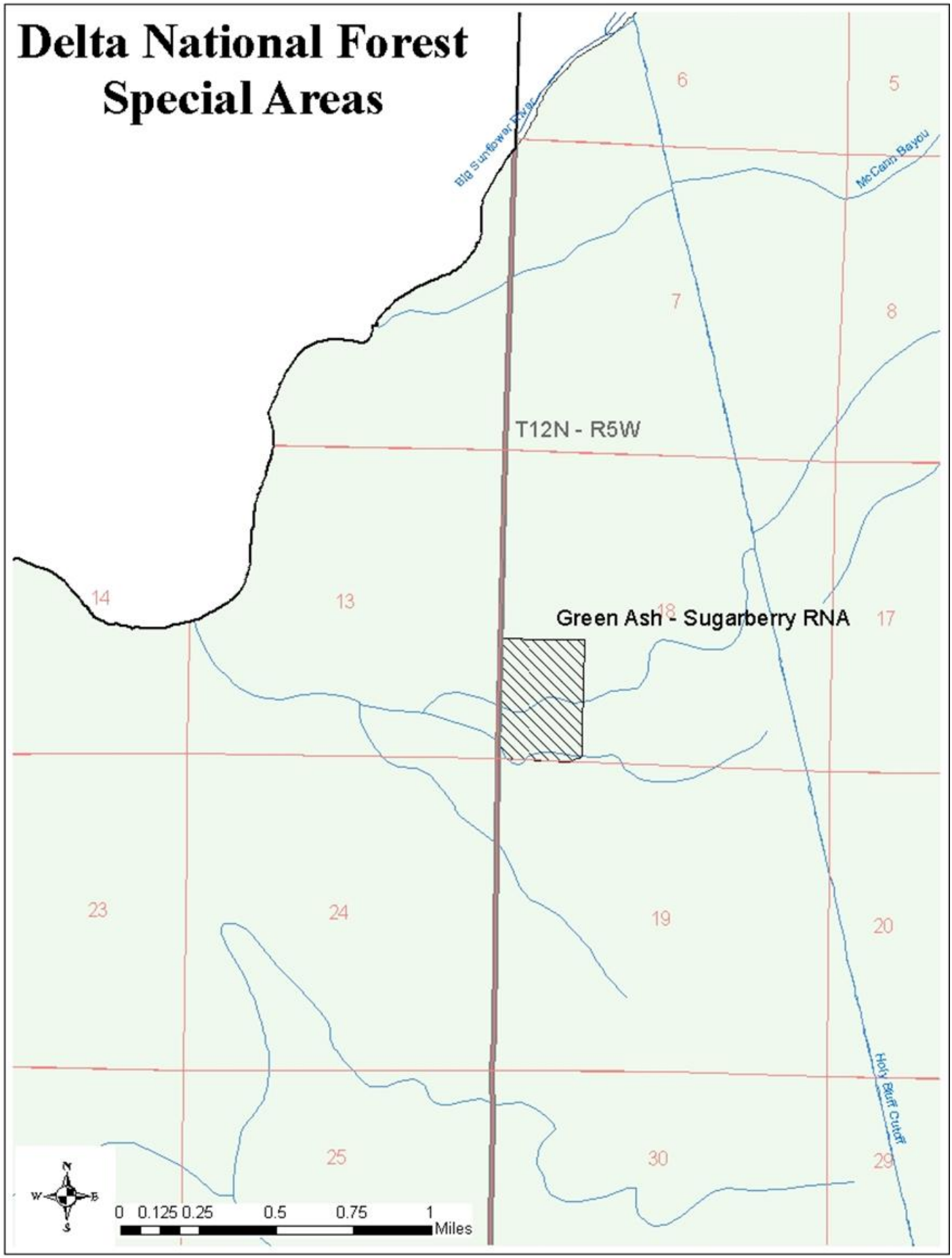
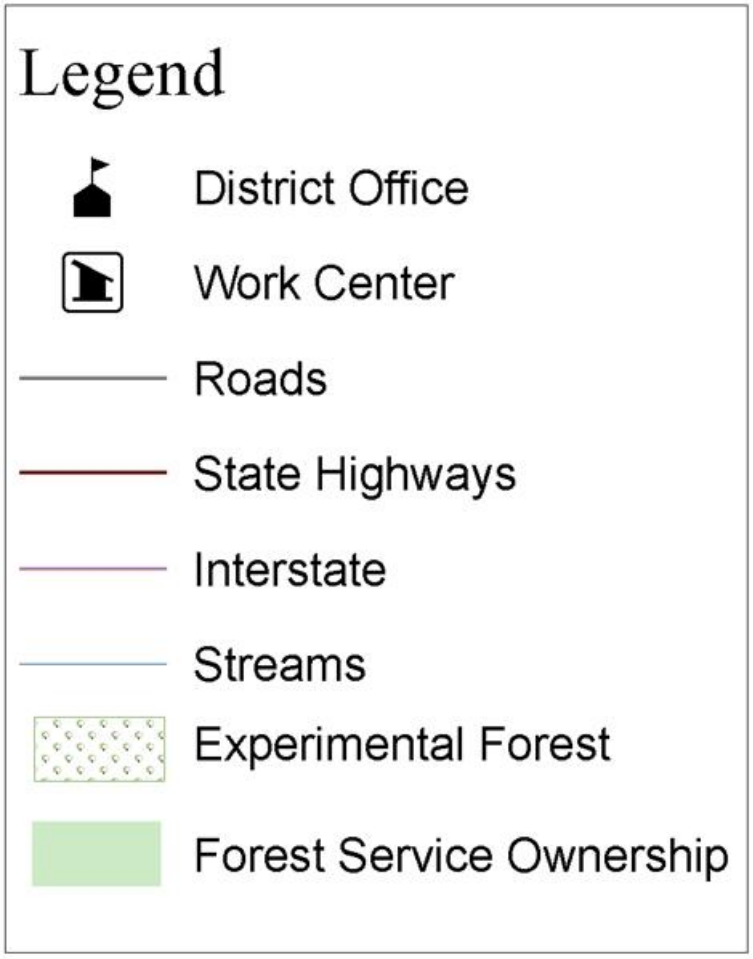


Figure D 28. Map of Green Ash – Sugarberry Research Natural Area

D.2.16 Tallahatchie Experimental Forest (Holly Springs National Forest):

Scientists in research work units use the Tallahatchie Experimental Forest as a site for their studies and demonstration projects in conjunction with the National Forests in Mississippi. Among the experiments conducted on these forests are studies on stand management and regeneration; restoration of wildlife and plant populations; watershed management; and the effects of pollution, climate change, and timber harvest.



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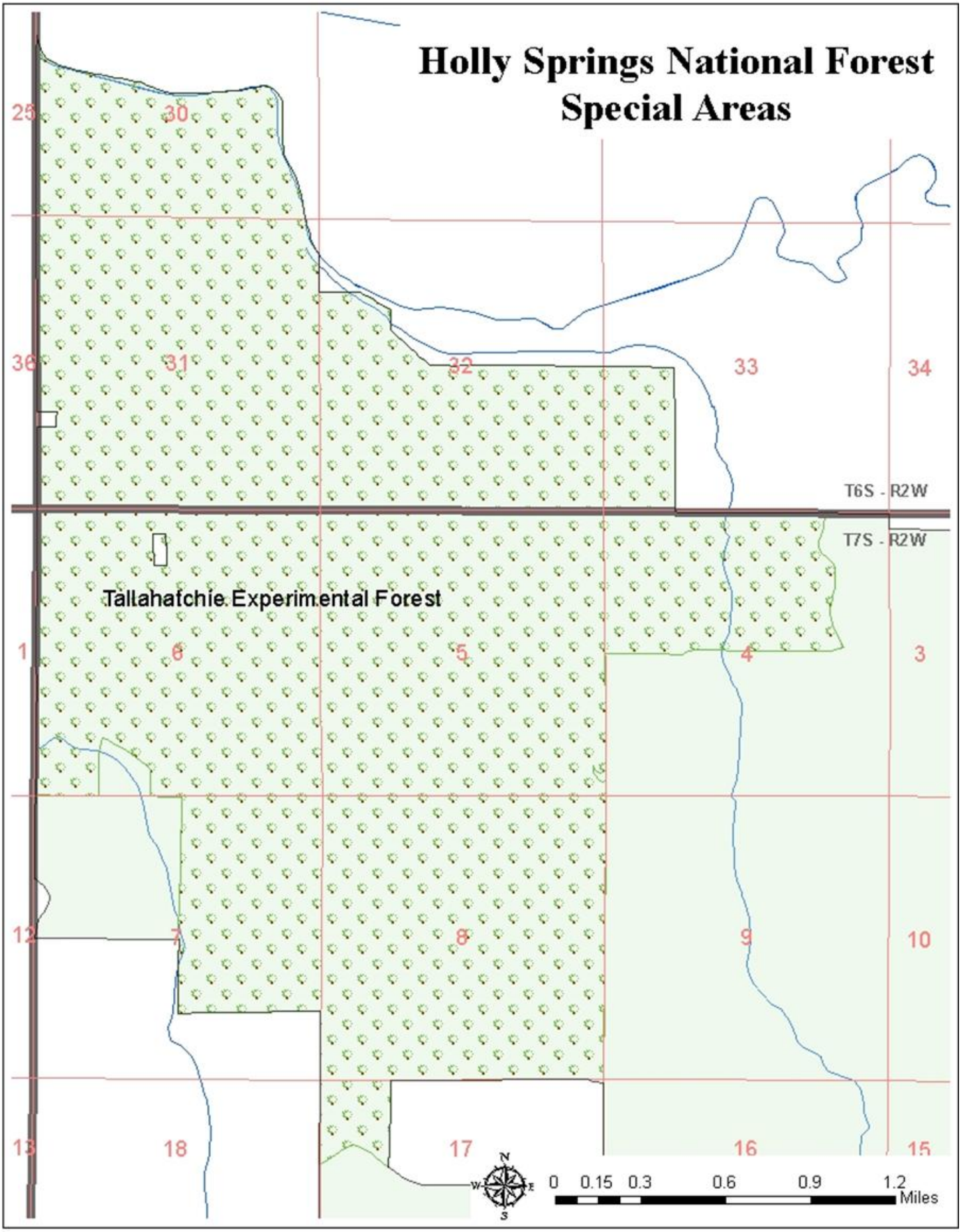
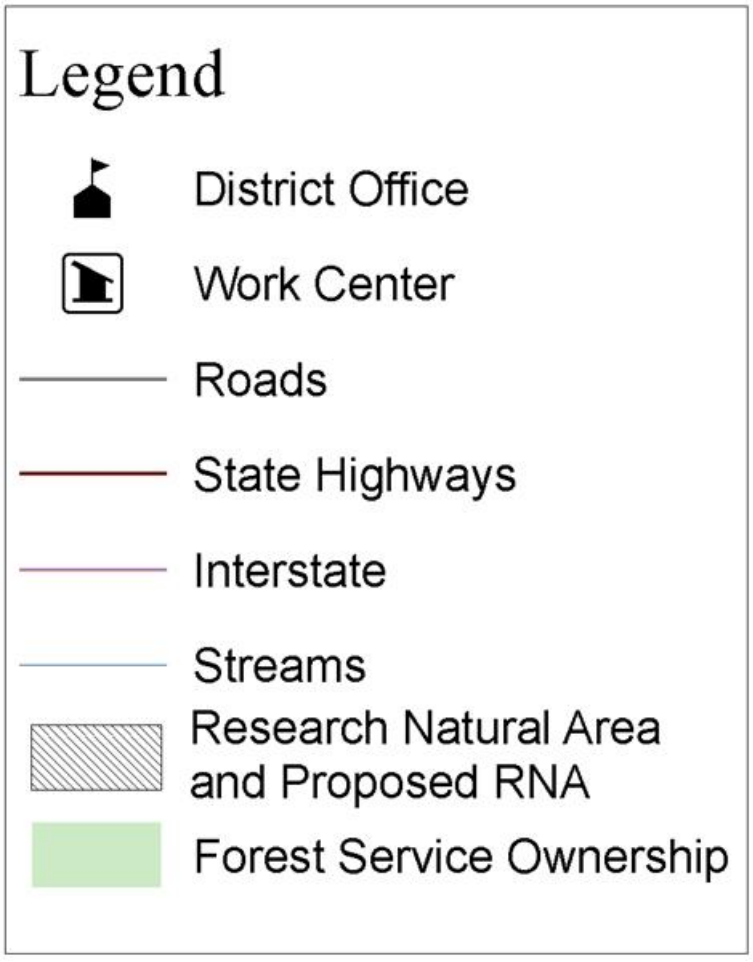


Figure D 29. Map of Tallahatchie Experimental Forest

D.2.17 Noxubee Crest Research Natural Area (Tombigbee National Forest):

The Noxubee Crest Research Natural Area encompasses the headwaters of a branch of the Little Noxubee River. Much of the uplands are old field areas that were abandoned in the 1930s, but the steep side slopes and creek bottoms contain fine examples of 120+ year-old shortleaf pine-oak-hickory forest. Noxubee Crest continues to provide habitat for wooded spring seep and dry-mesic mixed oak forest. Hydrological function of associated seeps and springs is intact. As a research natural area, this area provides undisturbed base line sites on which to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community it serves as an area in which natural biological diversity is conserved.



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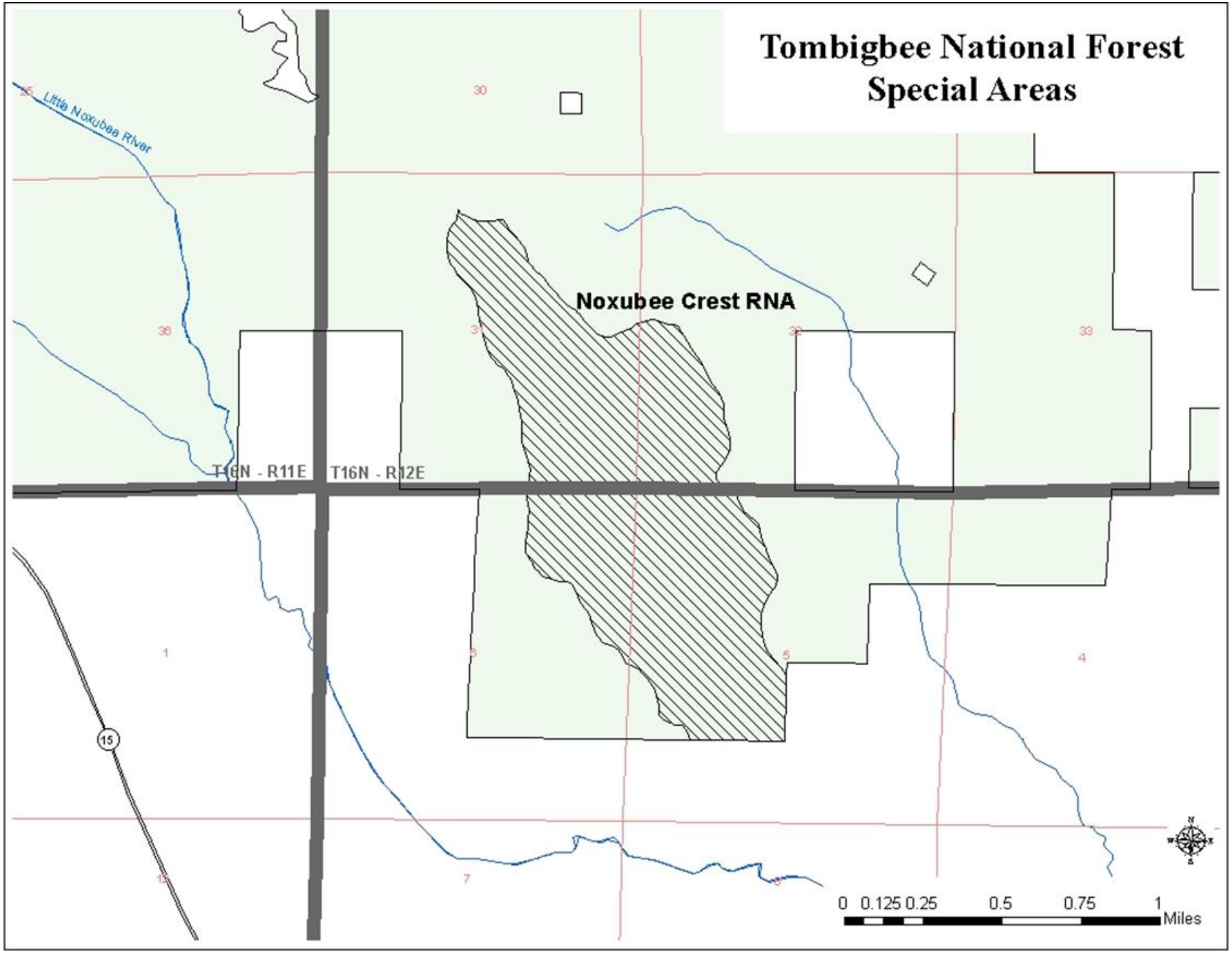
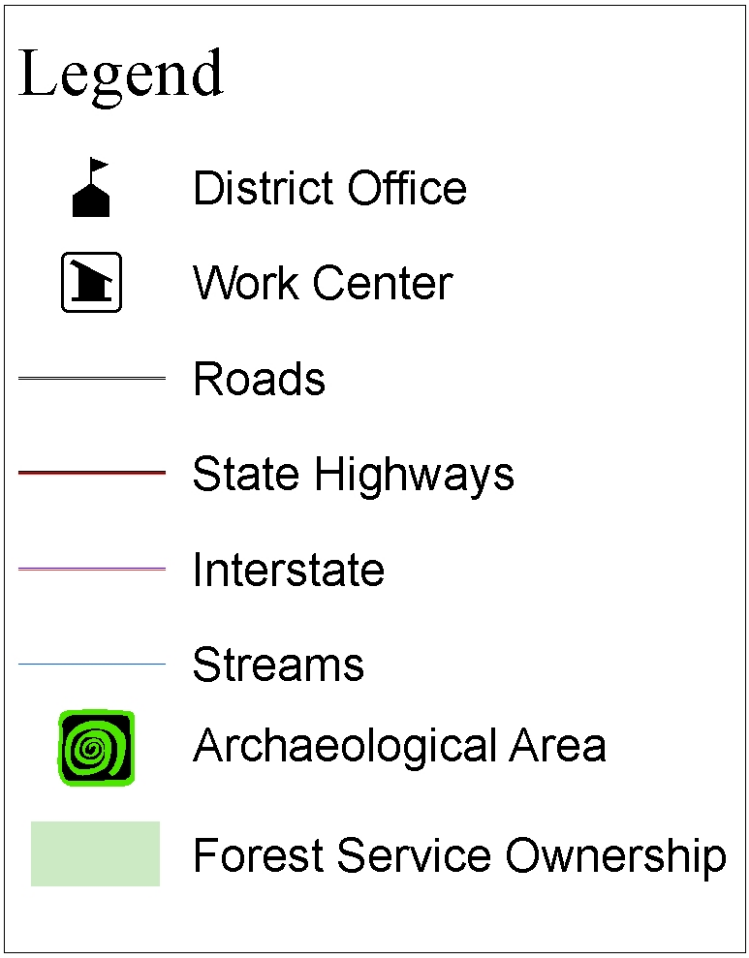


Figure D 30. Map of Noxubee Crest Research Natural Area

D.2.18 Owl Creek Mounds Archaeological Site (Tombigbee National Forest):

Owl Creek Mounds Archaeological Site is an Indian mound and village site on the Tombigbee National Forest. It dates from the late woodland period (A.D. 800) and is a classic example of the mounds of this period. This site is listed on the National Register of Historic Places. The cultural resources are protected and available for research.



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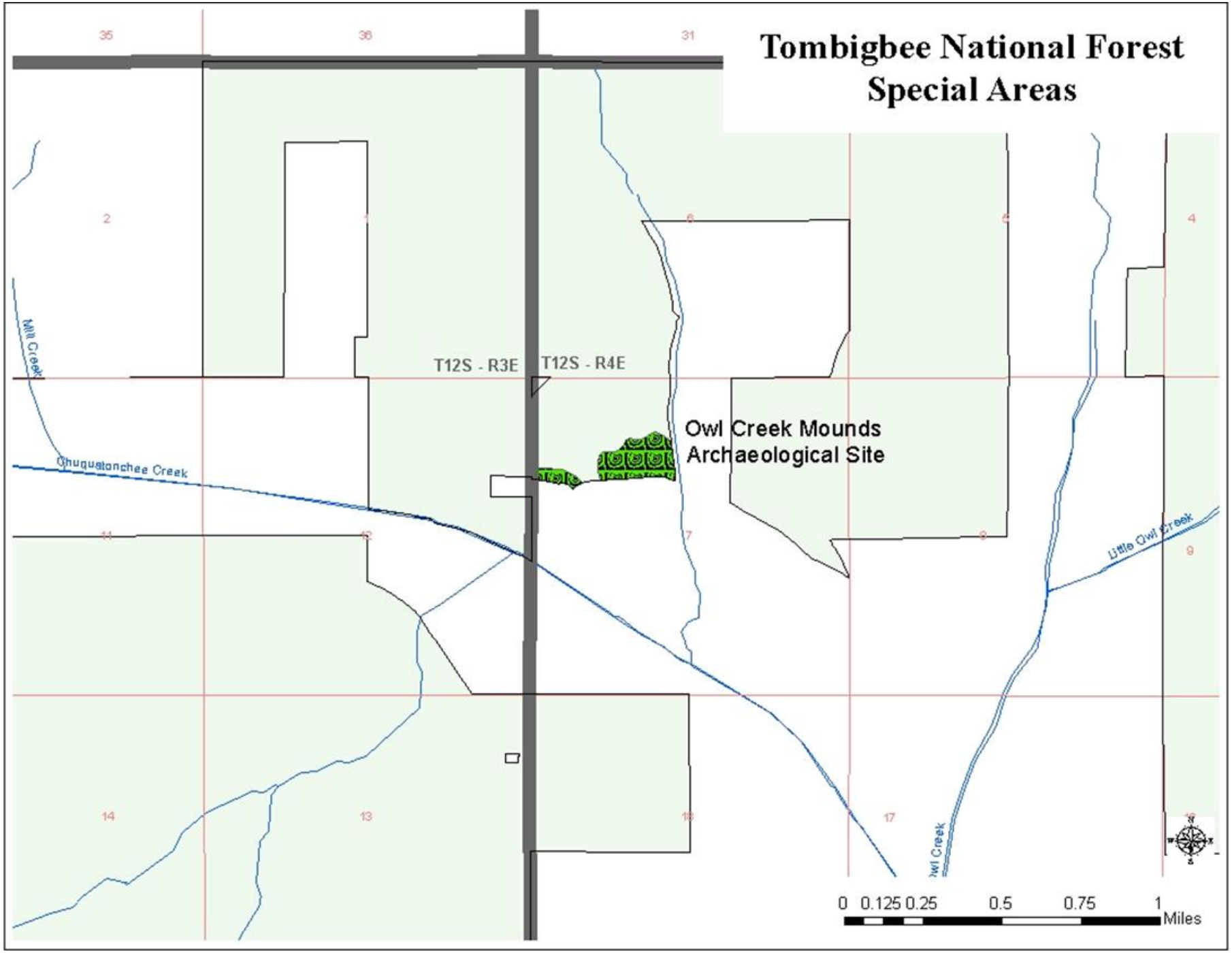
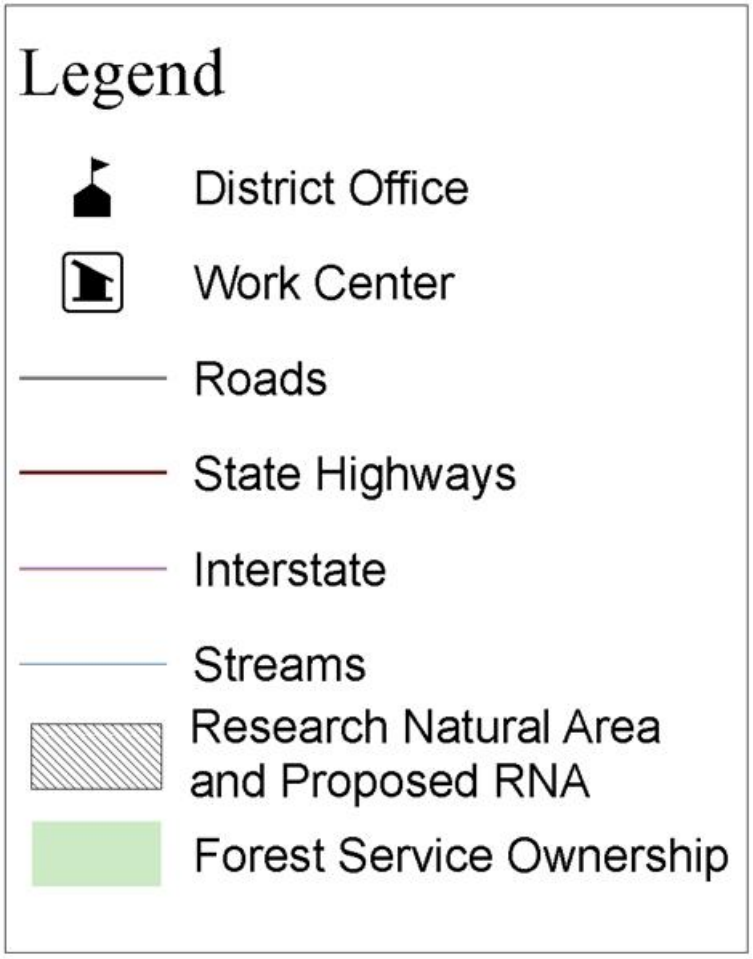


Figure D 31. Map of Owl Creek Mounds Archaeological Site

D.2.19 Chuquatonchee Bluffs Research Natural Area (Tombigbee National Forest):

This bluff area is on a steep north-facing mesic slope overlooking the floodplain of Chuquatonchee Creek. This is an old-growth Pontotoc ridge forest. Aerial photographs dated 1937 show trees in the area with large crowns. The area supports a rich flora.

The bluff area continues to support healthy examples of the Pontotoc ridge forest type. Hydrological function of associated seeps and springs is intact. As a research natural area, this area provides undisturbed base line sites on which to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community it serves as an area in which natural biological diversity is conserved.



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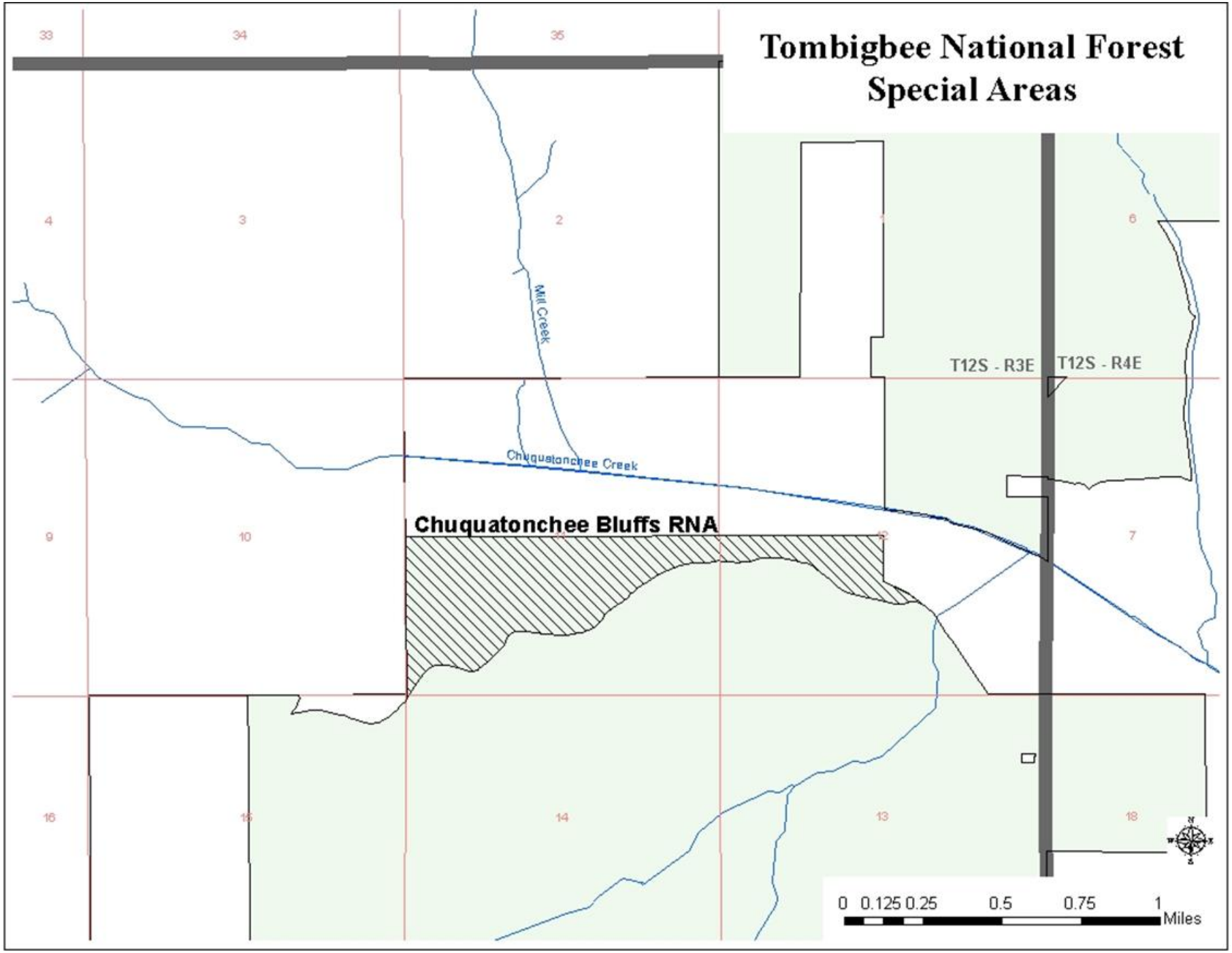

Figure D 32. Map of Chuquatonchee Bluffs Research Natural Area

D.3 Proposed New Special Areas

In addition to the previously designated areas listed above, the National Forests in Mississippi also contain a number of distinctive locations that have been evaluated and proposed for special area designation. As shown in Table D 2, 20 proposed areas located across the 7 ranger districts have been identified for evaluation and designation as botanical areas, research natural areas, or other appropriate administrative designations. These proposed special areas have been managed for their identified special characteristics and are at various stages of consideration and study for special area designation. The final designations will occur through the forest plan revision process. One area has been reviewed and determined to not meet criteria for designation as a botanical area. A second area proposed for research natural area designation has been dropped from further special area consideration. See detailed descriptions of individual proposed areas listed below in Singleton Prairie Table D 2. These descriptions contain rationale for dropping two areas from special area consideration.

Table D 2 identifies the proposed special areas, their recommended designations, district in which the area is located, and the size of the proposed area.

Table D 2. Proposed new special areas of the National Forests in Mississippi

Area Name As Proposed	Area Designation Recommendation	District	Acres
Singleton Prairie Botanical Area	Drop Consideration	Bienville	80
Nutmeg Hickory Research Natural Area	Research Natural Area	Bienville	307
Laurel Oak Research Natural Area	Botanical Area	Chickasawhay	277
Railroad Creek Titi Botanical Area	Botanical Area	De Soto	451
Little Florida Botanical Area	Botanical Area	De Soto	121
Pitcher Plant Botanical Area	Botanical Area	De Soto	251
Buttercup Flat Botanical Area	Botanical Area	De Soto	164
Loblolly Bay Research Natural Area	Botanical Area	De Soto	93
Ragland Hills Research Natural Area	Botanical Area	De Soto	237
Granny Creek Bay Research Natural Area	Research Natural Area	De Soto	127
Wyatt Hills Botanical Area	Botanical Area	De Soto	100
Cypress Bayou Botanical Area	Botanical Area	Delta	262
LA-2 Botanical Area C117S17	Botanical Area	Holly Springs	12
LA-6 Botanical Area C122S	Botanical Area	Holly Springs	158
Lee Creek Research Natural Area	Drop Consideration	Holly Springs	186
Sandy Creek Research Natural Area / Botanical Area	Botanical Area	Homochitto	300
Shagbark Hickory Botanical Area	Botanical Area	Tombigbee	109
Choctaw #4 Botanical Area	Botanical Area	Tombigbee	45
Prairie Mount Research Natural Area	Botanical Area	Tombigbee	370
Bogue Cully Research Natural Area	Botanical Area	Tombigbee	500

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D.3.1 Proposed Singleton Prairie Botanical Area (Bienville National Forest):

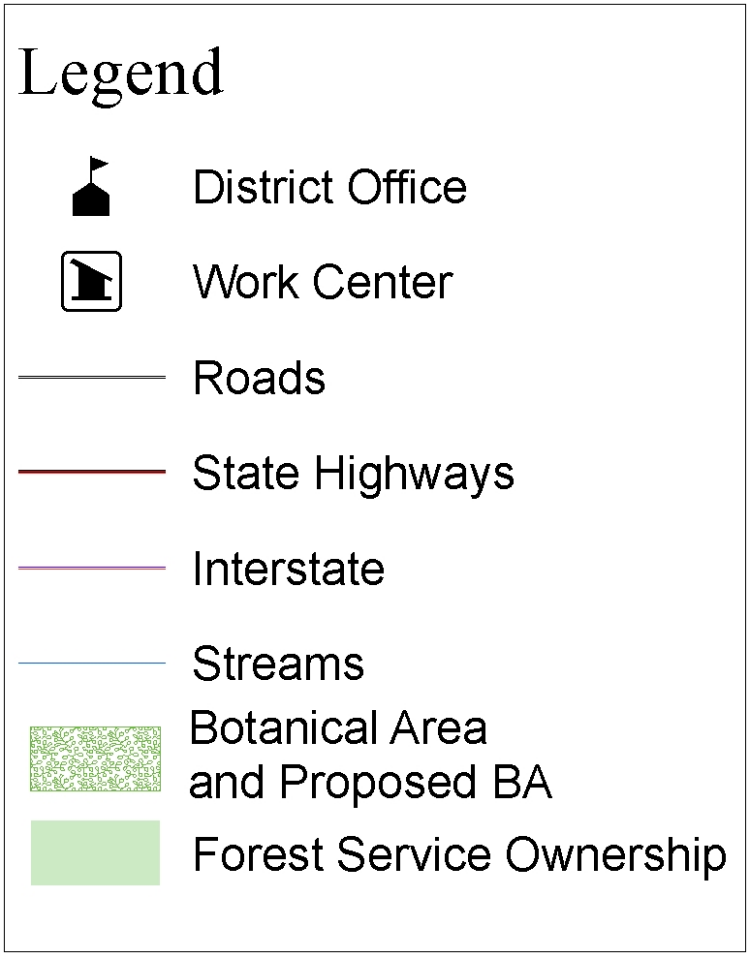
Singleton Prairie is a relict Jackson prairie, proposed under the 1985 forest plan as an area to be studied for potential botanical area designation. Prairies are greatly reduced from its historical acreage due to land conversion in the past to agricultural and forestry uses. Restored prairie furnishes habitat for typical plant and animal species once more common in this region of Mississippi. The Jackson prairie provides the necessary habitat conditions to support a full array of native prairie species such as indiangrass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, prairie cone-flowers, and others.

Field inspections and reviews have been completed. On the ground observations, indicate that Singleton prairie is less than 6 acres, instead of the 80 acres listed in 1985 forest plan. Currently the existing prairie opening is less than one acre. The 1989, Mississippi Museum of Nature Sciences' final report titled Bienville National Forest Prairie Survey indicate that Singleton Prairie was ranked one of the poorest examples of Bienville prairies (48 out 54 – 11th percentile). The report also stated that Singleton Prairie was a "…disturbed prairie with less than complete assemblage of prairie species, still restorable to prairie but with major efforts to manage and possibly many years for results. May also require seeding to replace species apparently "missing"."

Restoration and continued maintenance would be an additional concern due to the absence of reliable access. Management access is hindered due to wetlands and Hontokalo Creek.

Singleton Prairie should be protected in a manner consistent with other prairie; however, it should not rise to the level of a botanical area. Botanical areas should be one of our better examples of rare communities, rather than one of our poorer examples. Also, since a botanical area has a recreational function, FSM 2372.4 dictates that public use will be encouraged up to a level that does not encroach on the special values for which the area was established. In other words, public access should be a consideration when multiples sites are available for designation. Singleton Prairie Botanical Study Area has neither a high ranking, when compared to other prairies, or reasonable access for management or the public.

Singleton Prairie has been dropped from further consideration.



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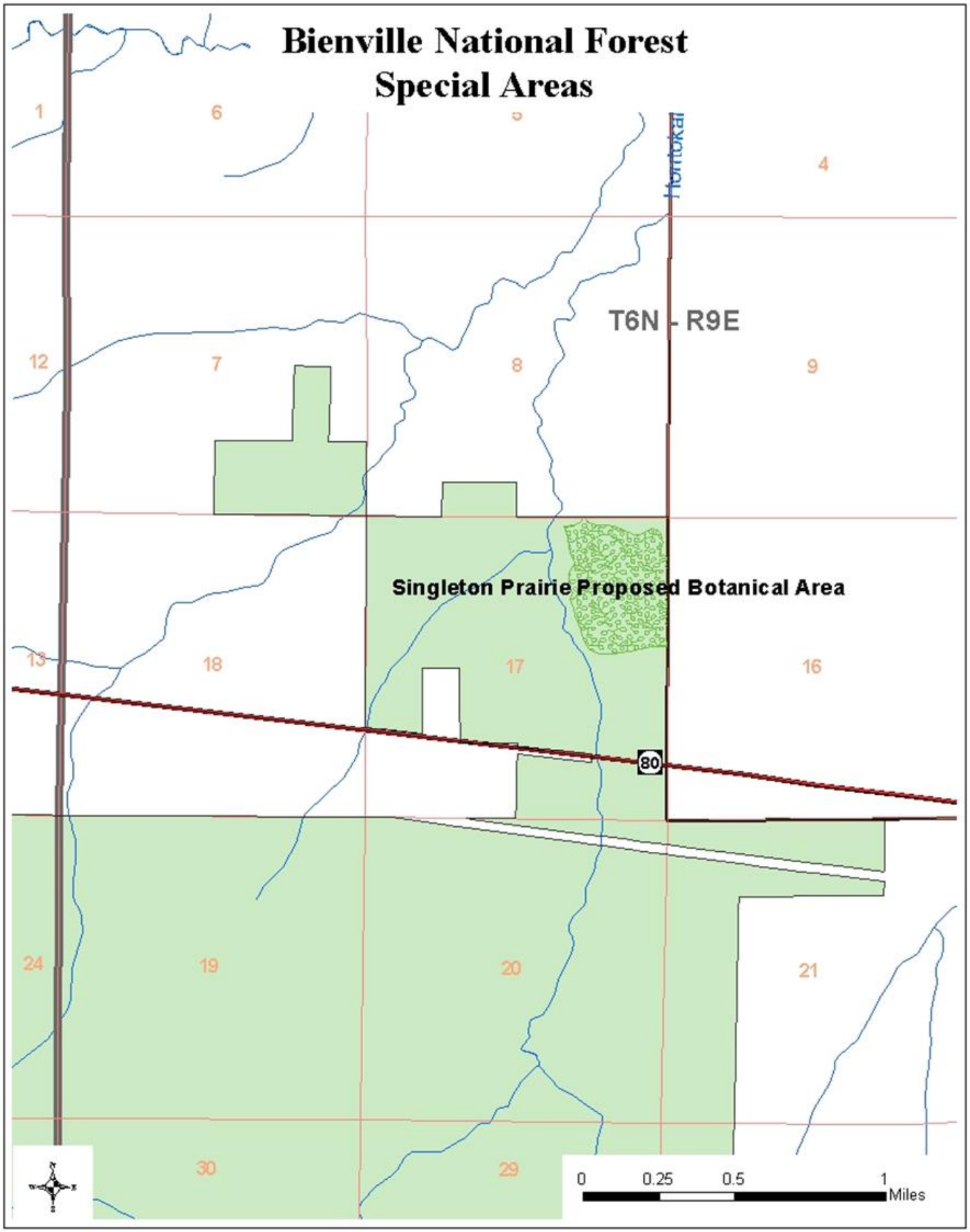
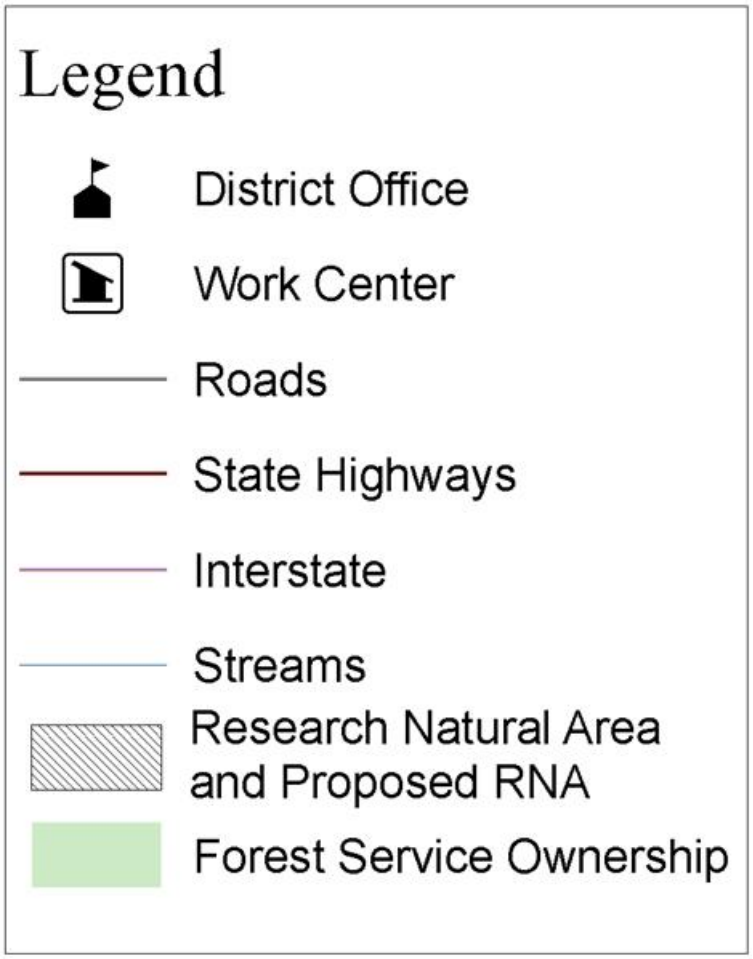


Figure D 33. Map of proposed Singleton Prairie Botanical Area

D.3.2 Proposed Nutmeg Hickory Research Natural Area (Bienville National Forest):

This calcareous variant of floodplain forest ecological system was proposed for establishment as a research natural area. It is a mature wet-mesic floodplain forest dominated by mature specimens of native prairie forest species such as nutmeg hickory, Durand oak, and big shellbark hickory. As a research natural area, this area provides undisturbed base line areas to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved. The nomination and evaluation process has been completed for this research natural area. Further, a decision to dedicate this area as a research natural area was made on September 22, 2003 by the regional forester. However, final public notification was not completed previously. This area is being formally designated through this forest plan revision.



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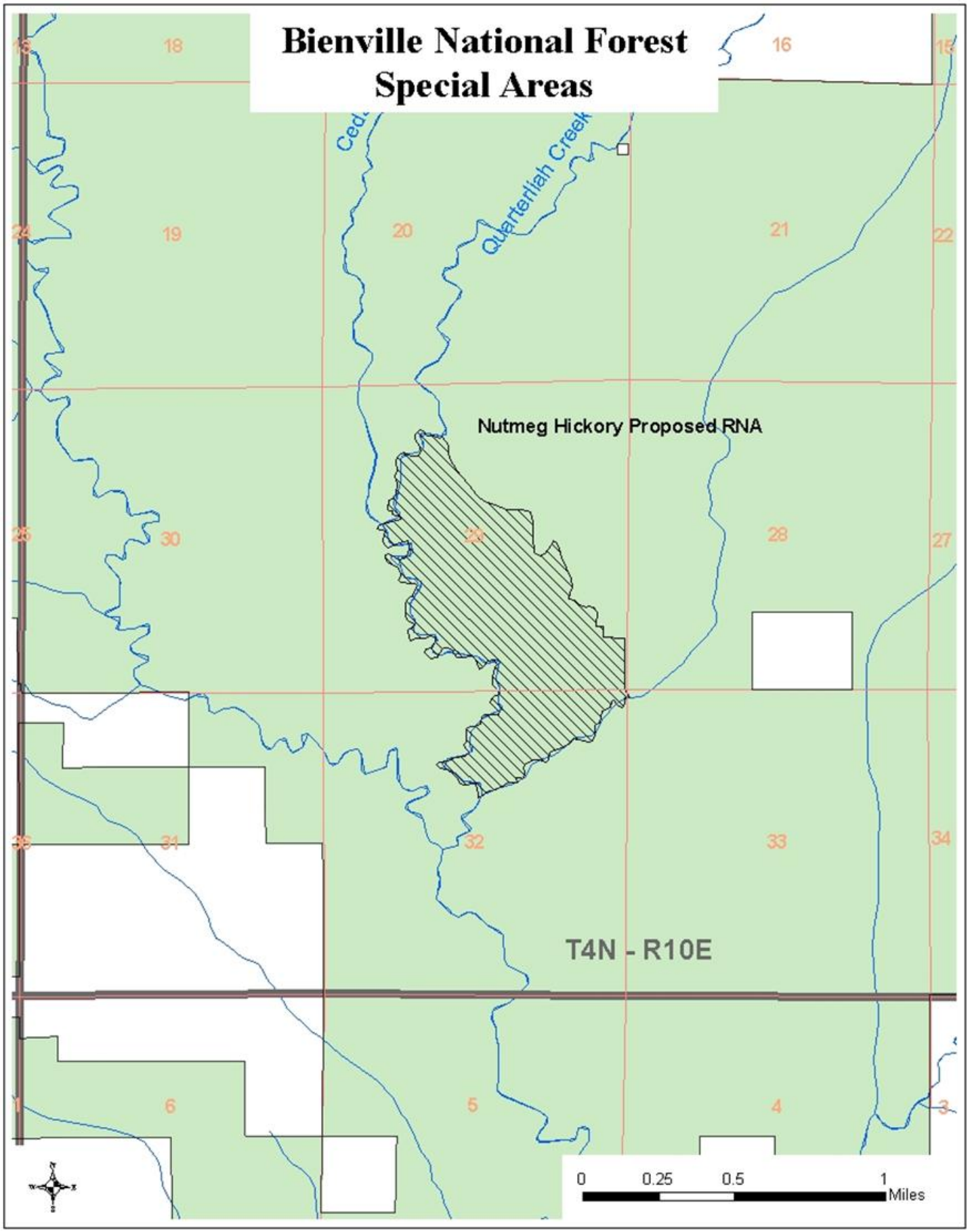
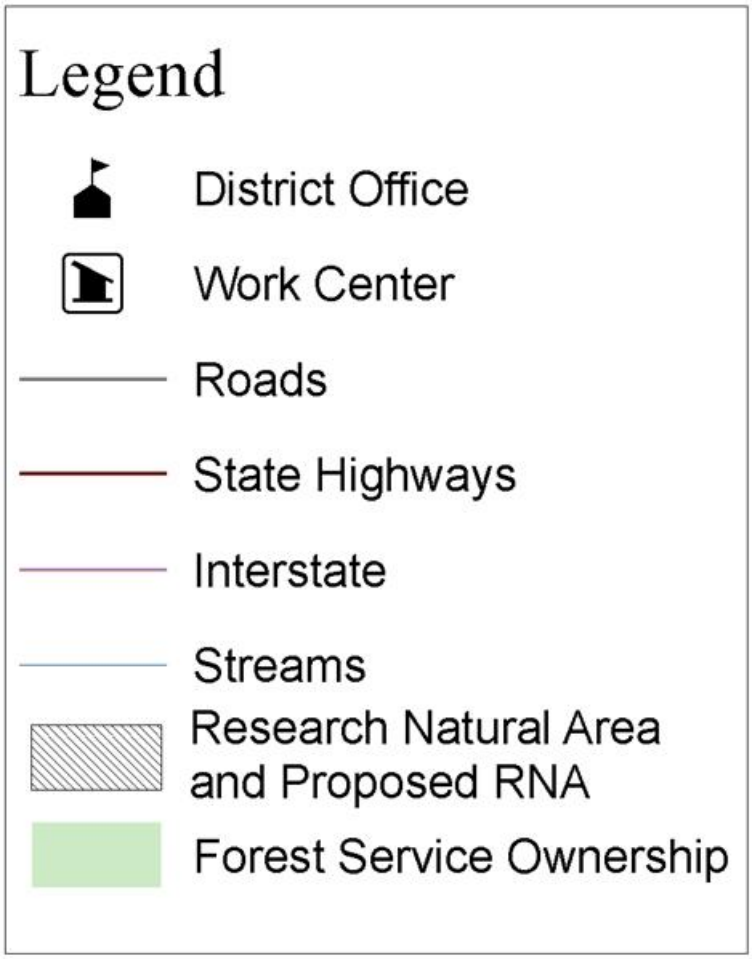


Figure D 34. Map of proposed Nutmeg Hickory Research Natural Area

D.3.3 Proposed Laurel Oak Botanical Area (Chickasawhay Ranger District, De Soto National Forest):

This area was originally proposed by district staff for research natural area designation. The botanical area designation was chosen as the best way to provide special area status for this area. As a botanical area, this area provides undisturbed base line area to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved. The area is a minor stream bottom with stands predominated by laurel oak and loblolly pine.



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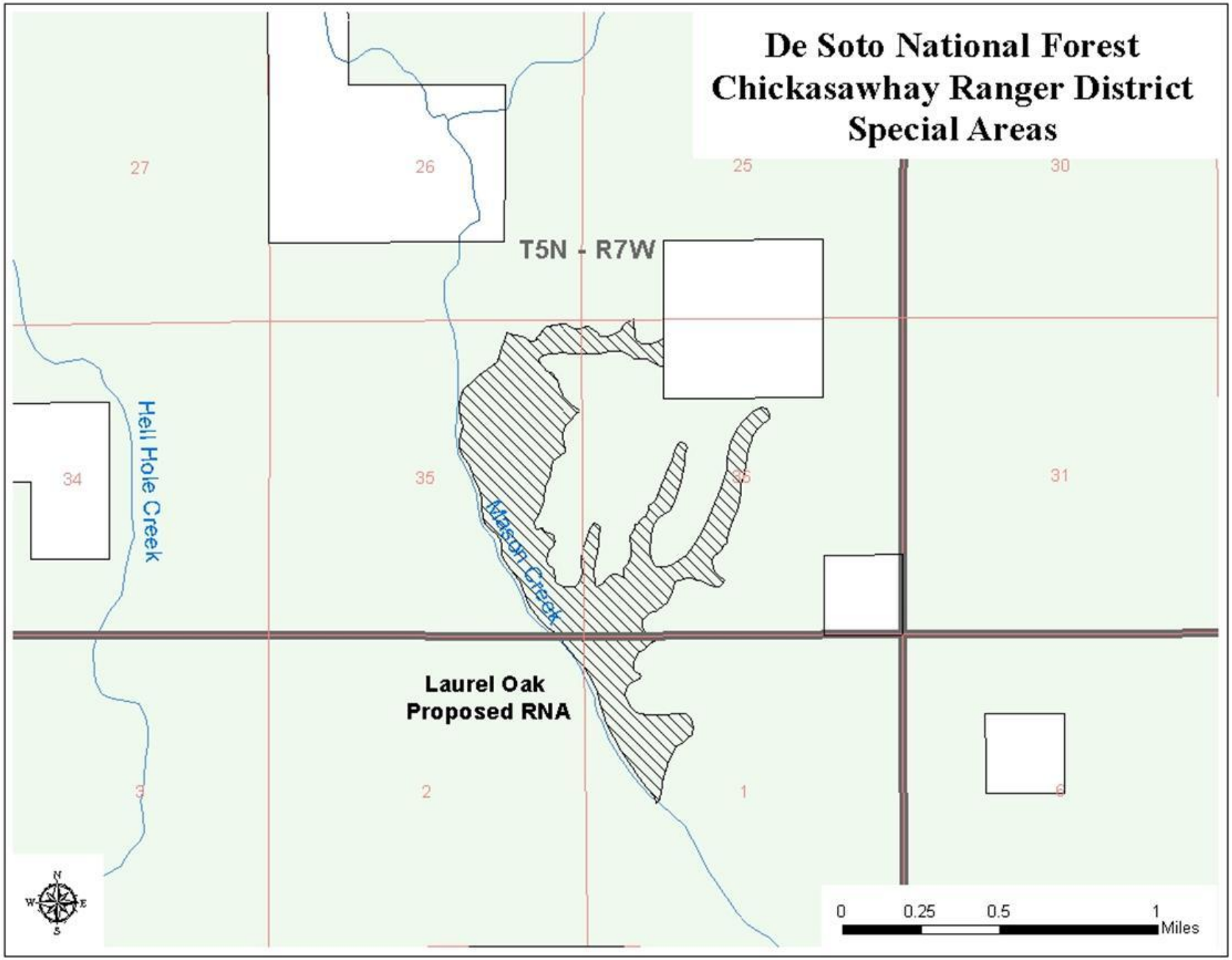
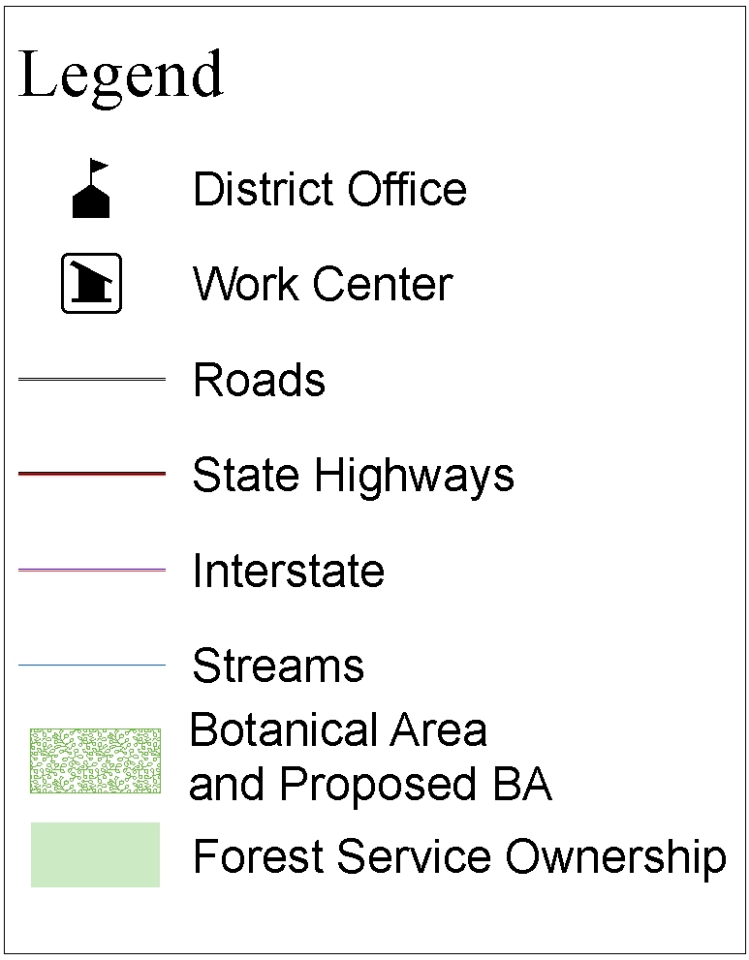


Figure D 35. Map of proposed Laurel Oak Research Natural Area - Botanical Area

D.3.4 Proposed Railroad Creek Titi Botanical Area (De Soto Ranger District, De Soto National Forest):

This botanical area includes an impressive and extensive stand of 30-foot tall, 4- to 7-inch diameter buckwheat trees beneath a slash pine dominated swamp forest along a black water creek. Swamp titi is also present but is not dominant. This area provides an undisturbed base line to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved.



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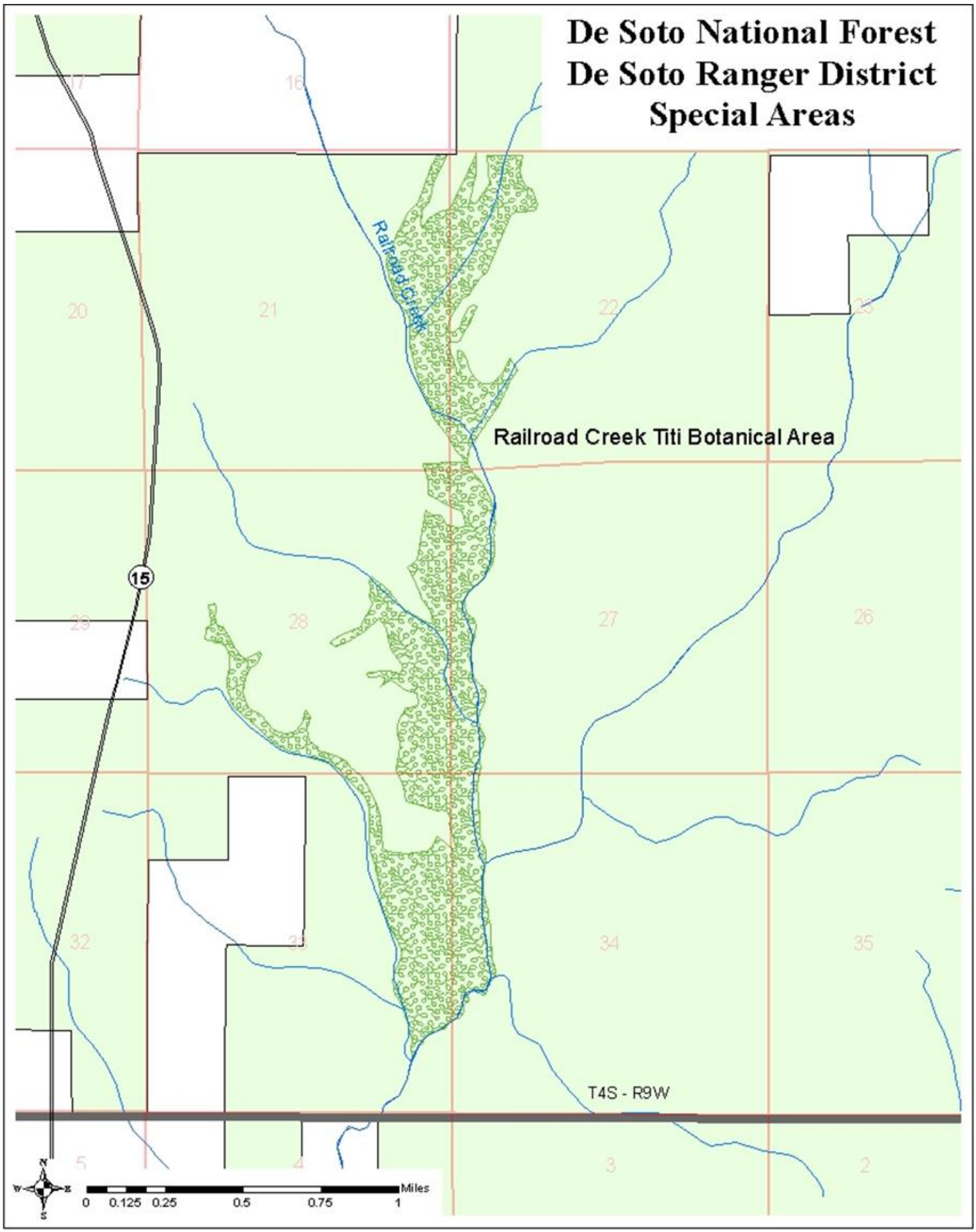
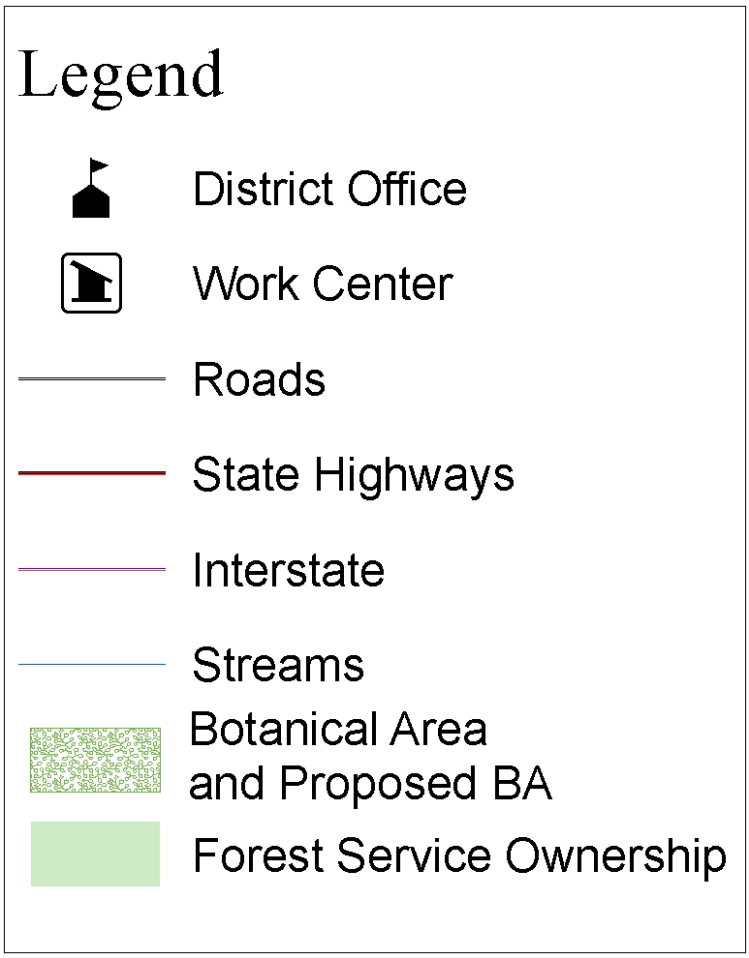


Figure D 36. Map of proposed Railroad Creek Titi Botanical Area

D.3.5 Proposed Little Florida Botanical Area (De Soto Ranger District, De Soto National Forest):

Little Florida contains the most extensive and highest quality xeric sandhill community with longleaf pine forest, saw palmetto, and other characteristic species remaining in Mississippi. Several plant species such as scarlet basil and littleleaf milkpea reach the western limits of their range at this site. The sand ridge is surrounded by more typical mesic longleaf forest and several drainages.



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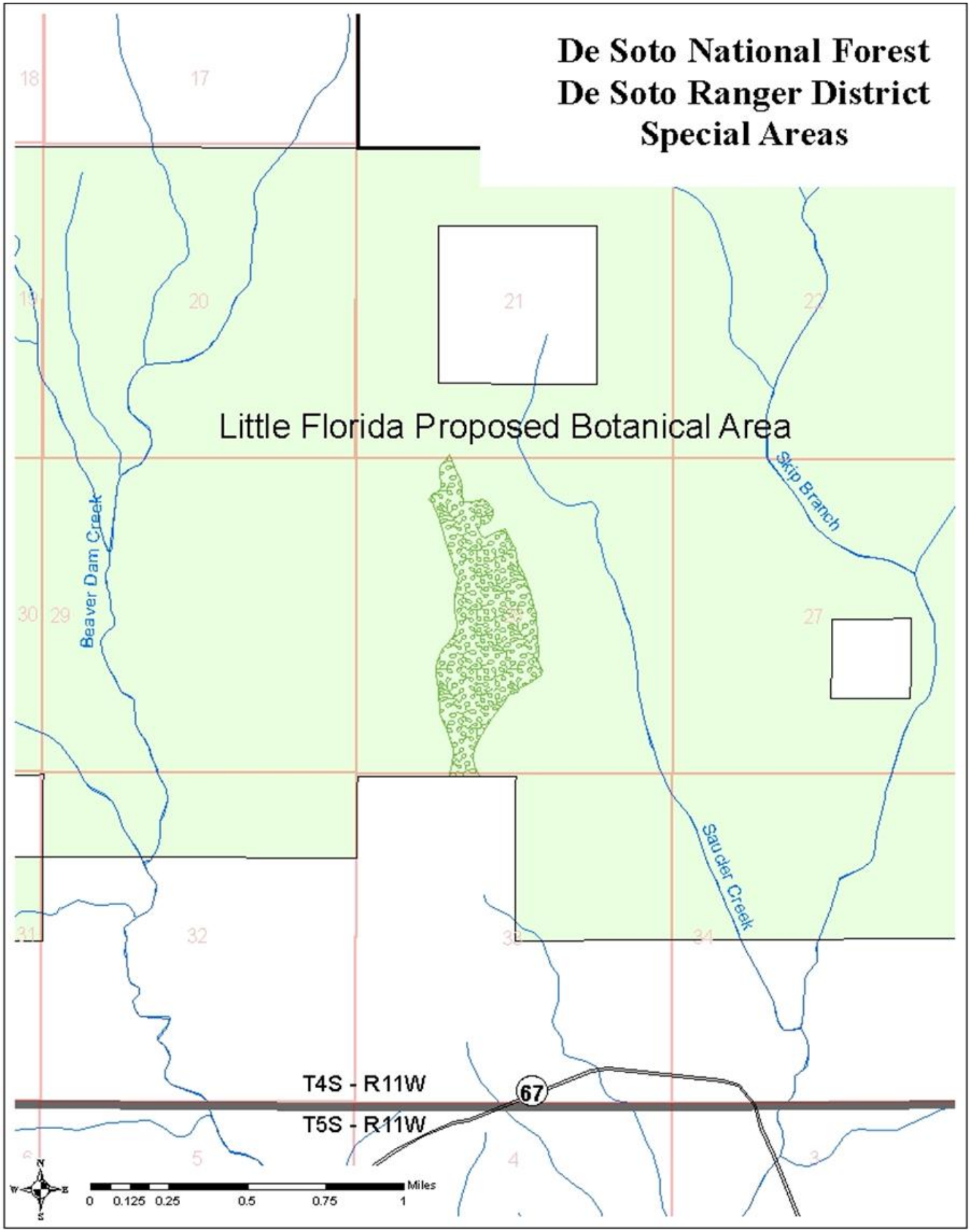
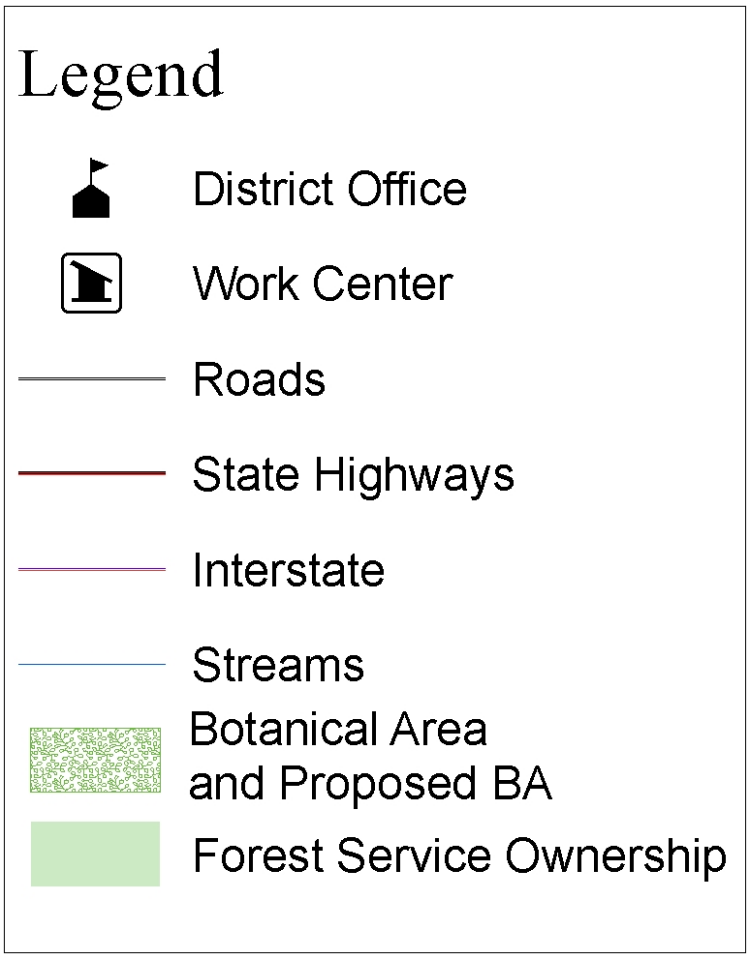


Figure D 37. Map of proposed Little Florida Botanical Area

D.3.6 Proposed Pitcher Plant Botanical Area (De Soto Ranger District, De Soto National Forest):

The Pitcher Plant Botanical Area consists of three distinct and rather unique quaking bogs in relatively close proximity to each other. Vegetation in these bogs floats on top of a saturated layer of peat which overlays an impervious sand layer 2 meters or more below the surface. This botanical area provides habitat for a variety of bog species as well as more common and diagnostic members of this ecosystem including pitcher plants, sundews, grasses and sedges.



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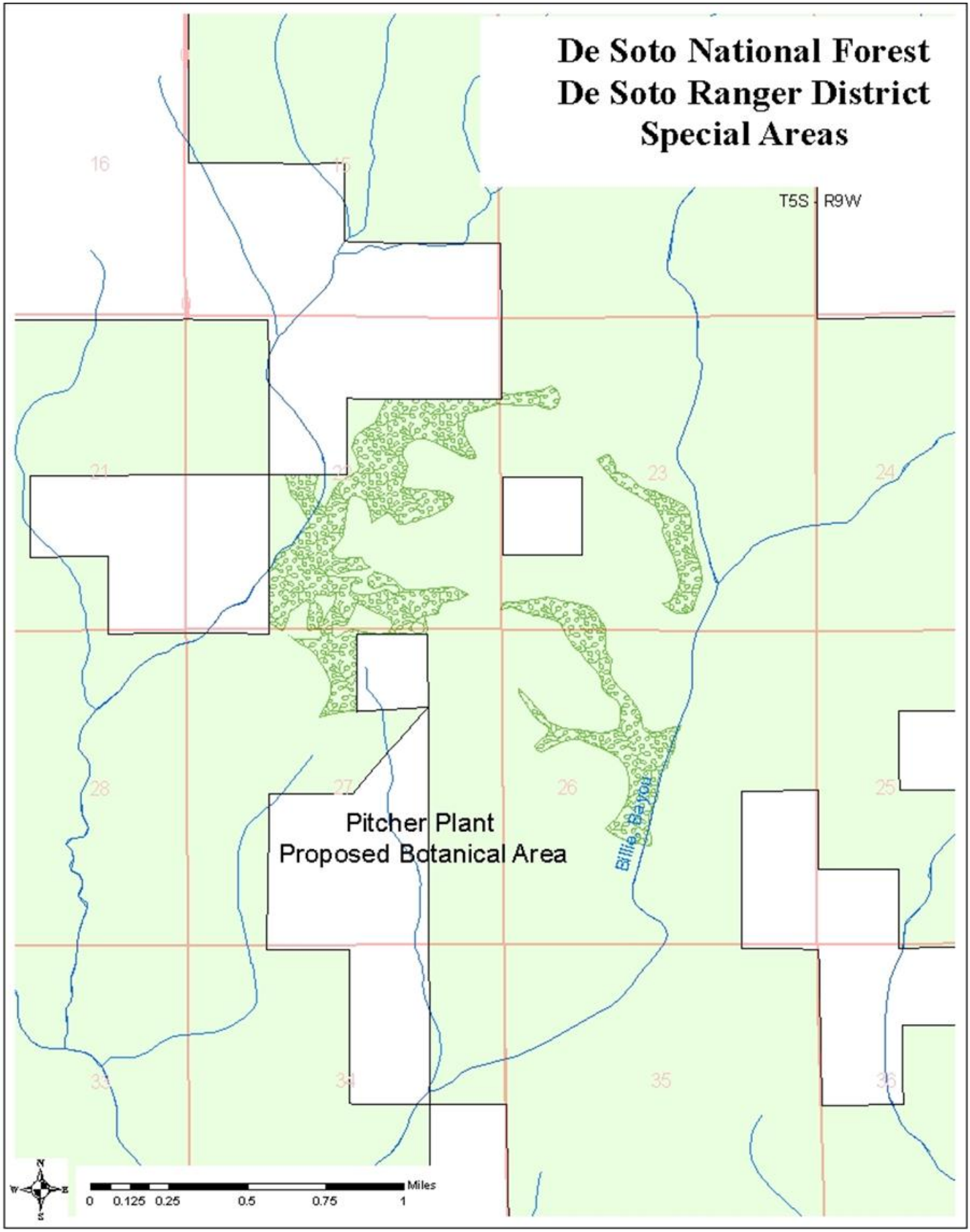
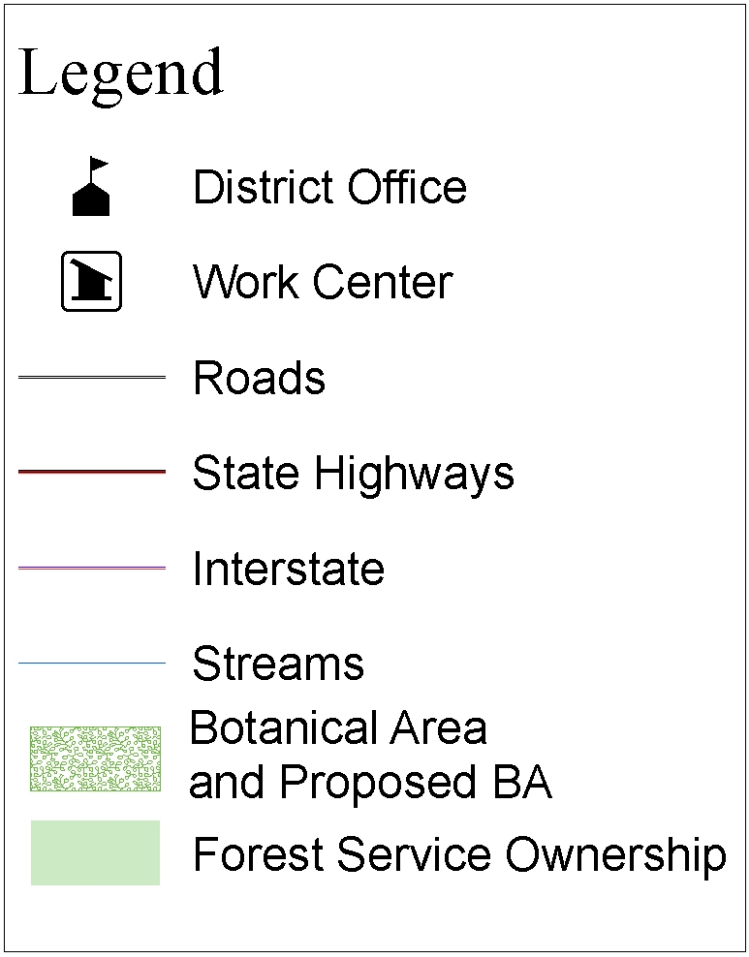


Figure D 38. Map of proposed Pitcher Plant Botanical Area

D.3.7 Proposed Buttercup Flat Botanical Area (De Soto Ranger District, De Soto National Forest):

The Buttercup Flat Botanical Area consists of a scenic pitcher plant savanna along State Highway 26. The savanna is intact hydrologically and provides habitat for a wide variety of common and diagnostic members of this system including pitcher plants, sundews, grasses, and sedges.



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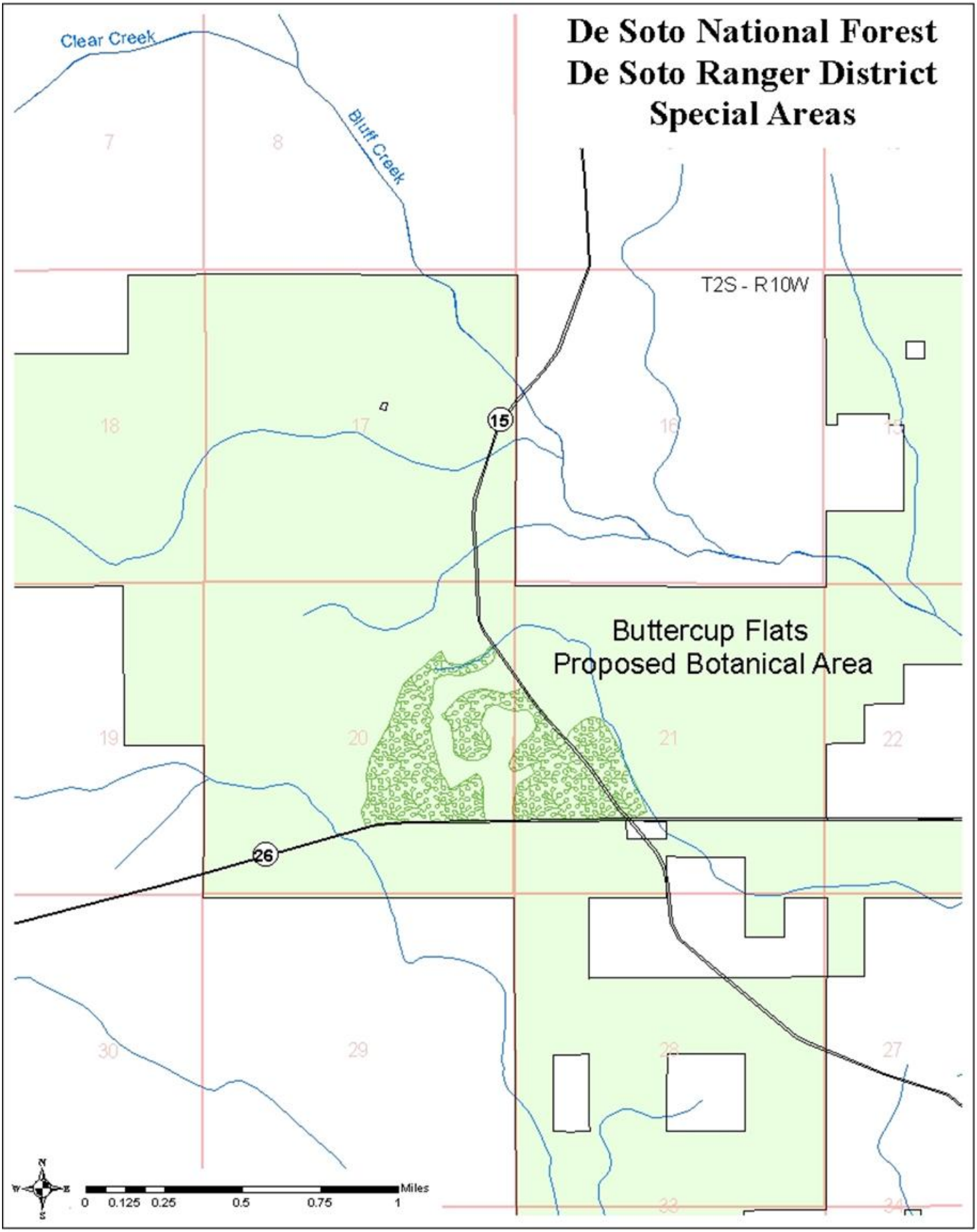
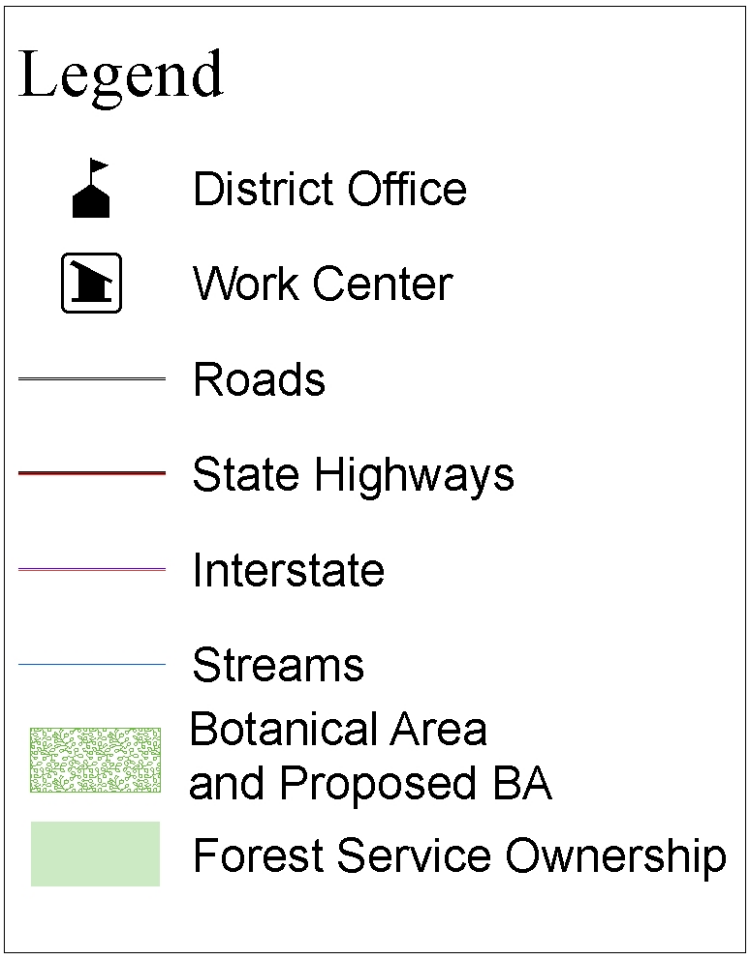


Figure D 39. Map of Proposed Buttercup Flats Botanical Area

D.3.8 Proposed Loblolly Bay Botanical Area (De Soto Ranger District, De Soto National Forest):

This botanical area is a classic bayhead community with sweetbay, swamp gum and slash pine as common dominants with yellow poplar, red maple, and water oak less common. Loblolly bay is present here in good numbers. The bayhead community provides habitat for the uncommon loblolly bay. Gopher tortoises live on the adjacent uplands which support longleaf pine.



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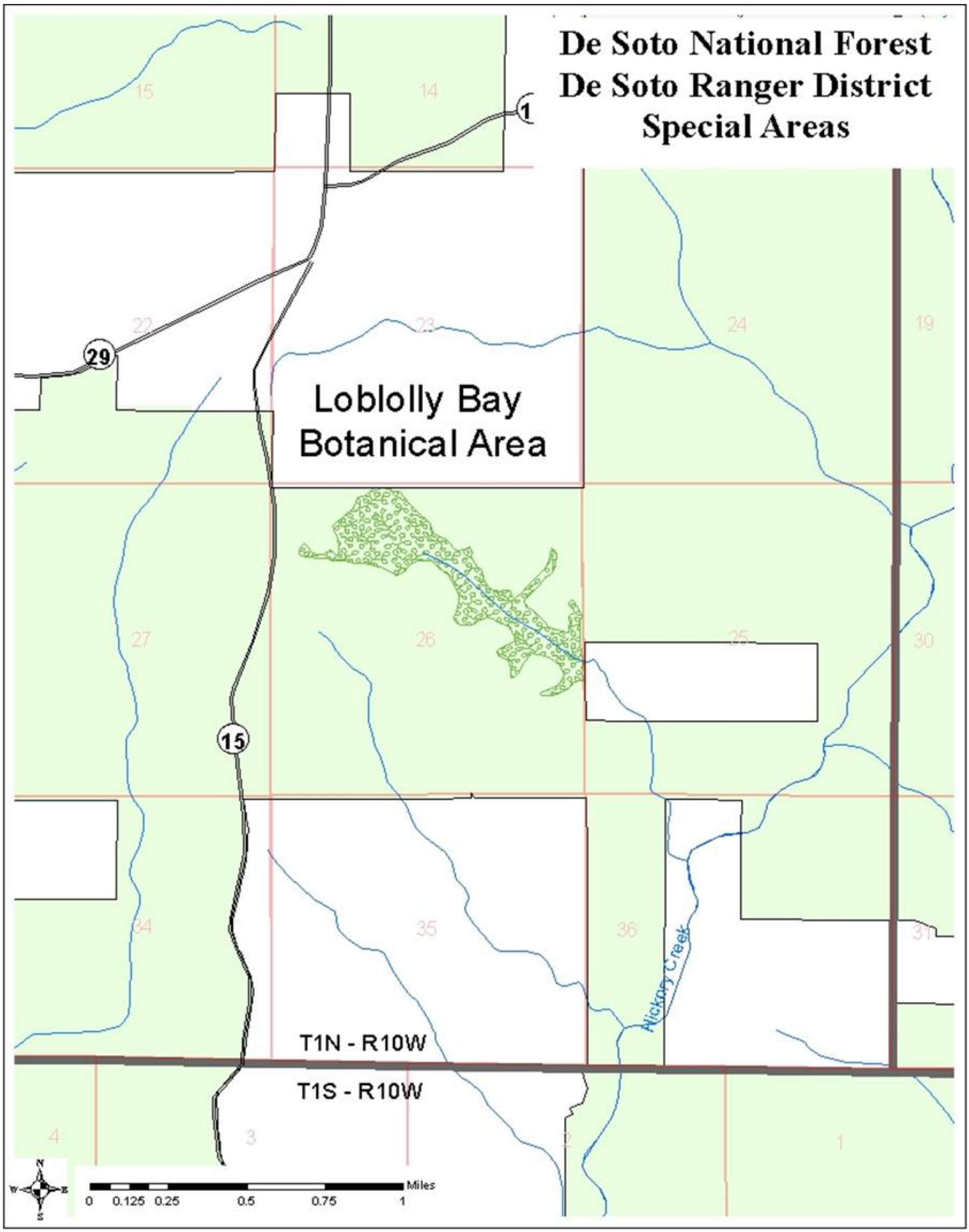
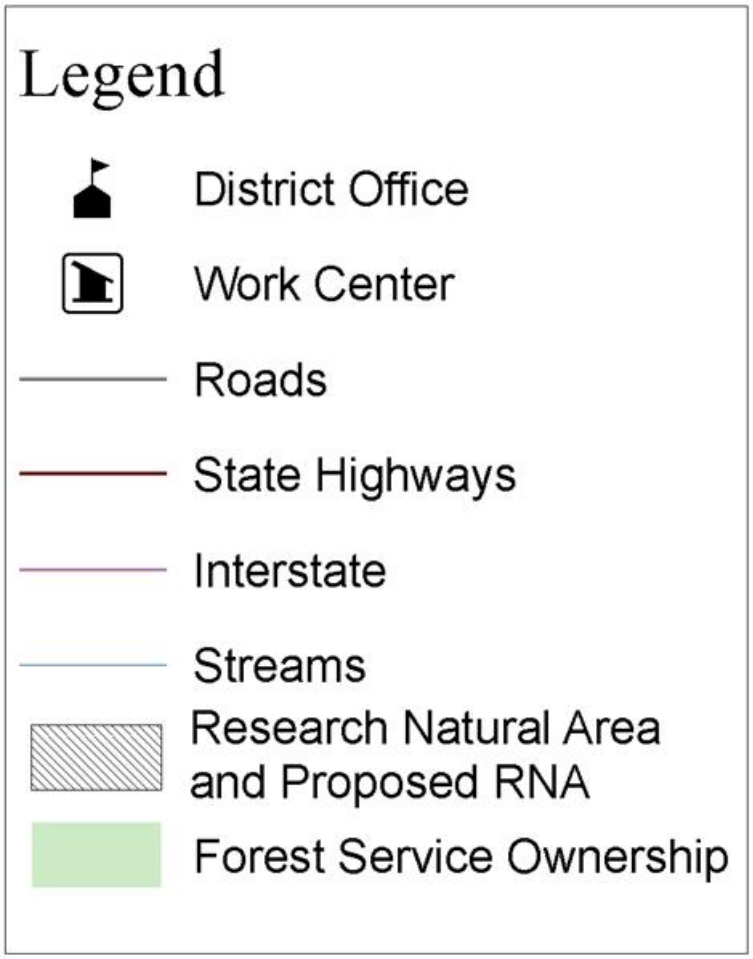


Figure D 40. Map of proposed Loblolly Bay Botanical Area

D.3.9 Proposed Ragland Hills Botanical Area (De Soto Ranger District, De Soto National Forest):

This area was originally proposed by district staff for research natural area designation. The botanical area designation was chosen as the best way to provide special area status for this area. The Ragland Hills Area is a classic southern mesophytic forest in deeply dissected ravines separated by well drained ridgetops which support longleaf pine. National Forest System lands are flanked by land owned by the University of Southern Mississippi and the Mississippi National Guard. Together these three publicly owned tracts offer opportunity for a multi-agency natural area preserve. The endemic big-leaf witch-hazel has recently been described from this community. As a proposed botanical area, this area provides an undisturbed base line site on which to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved.



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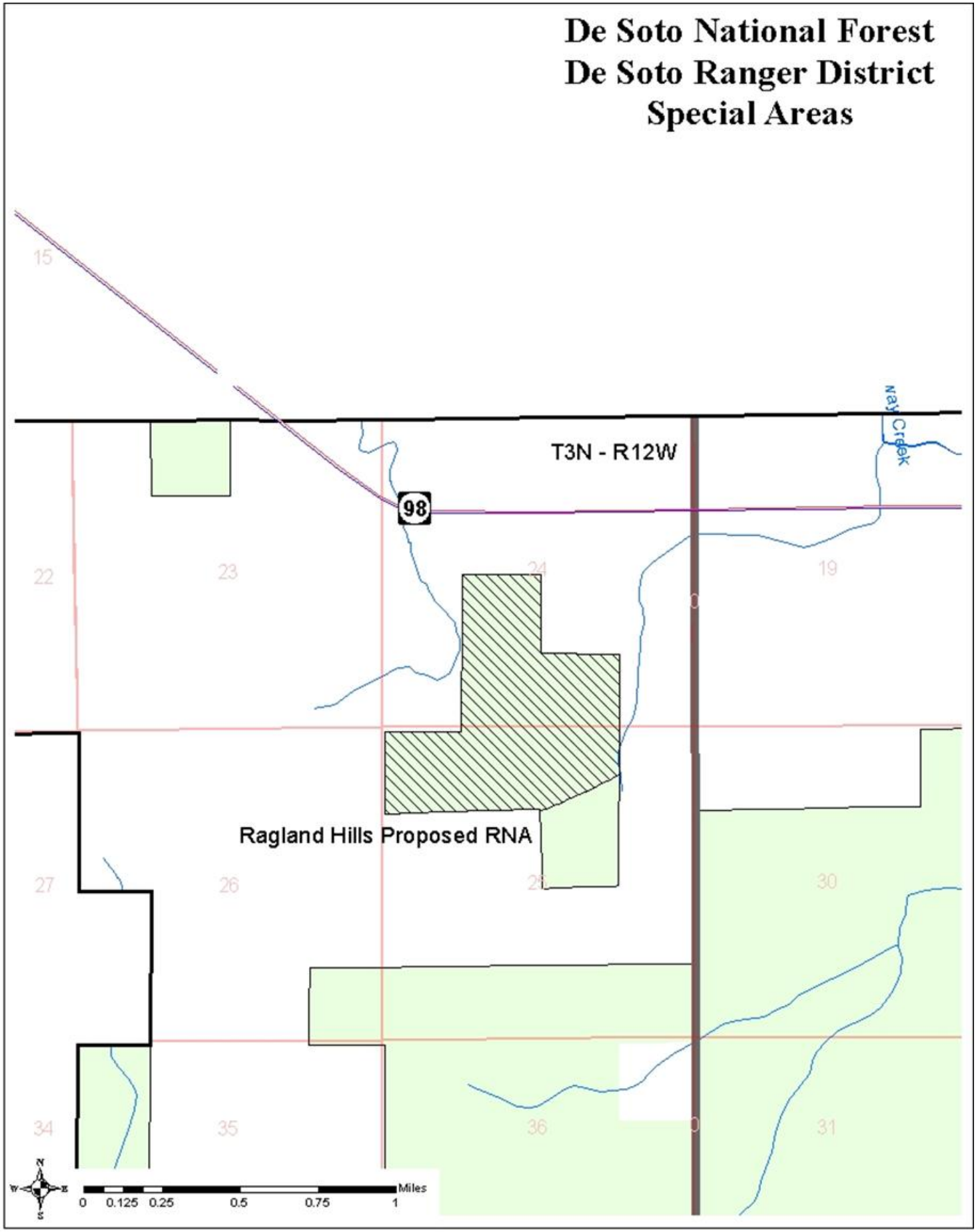
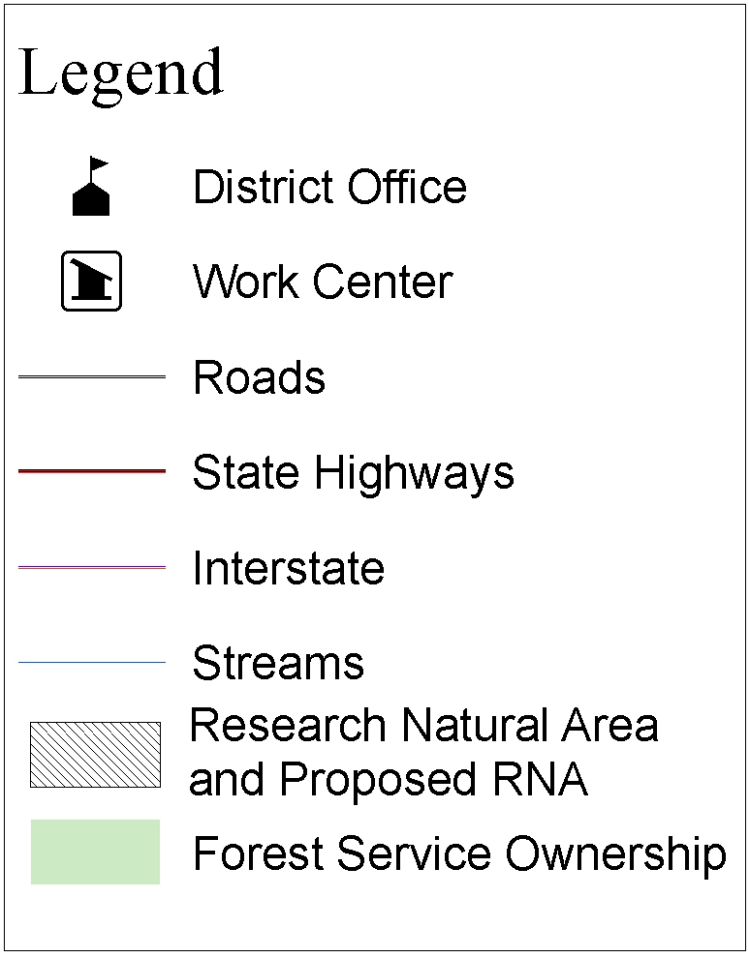


Figure D 41. Map of proposed Ragland Hills Research Natural Area - Botanical Area

D.3.10 Proposed Granny Creek Bay Research Natural Area (De Soto Ranger District, De Soto National Forest):

Granny Creek Bay is a large spring seep and associated seepage swamp of exceptional quality. It has been the focus of research conducted by biologists with the University of Southern Mississippi and the Mississippi Natural Heritage Program. As a research natural area, this area provides undisturbed base line areas to monitor changes in natural conditions associated with management of similar areas and serves as an area to conserve natural biological diversity. The nomination and evaluation process has been completed for this research natural area. Further, a decision to dedicate this area as a research natural area was made on March 26, 2002 by the regional forester. However, final public notification was not completed previously. This area is being formally designated through this forest plan revision.



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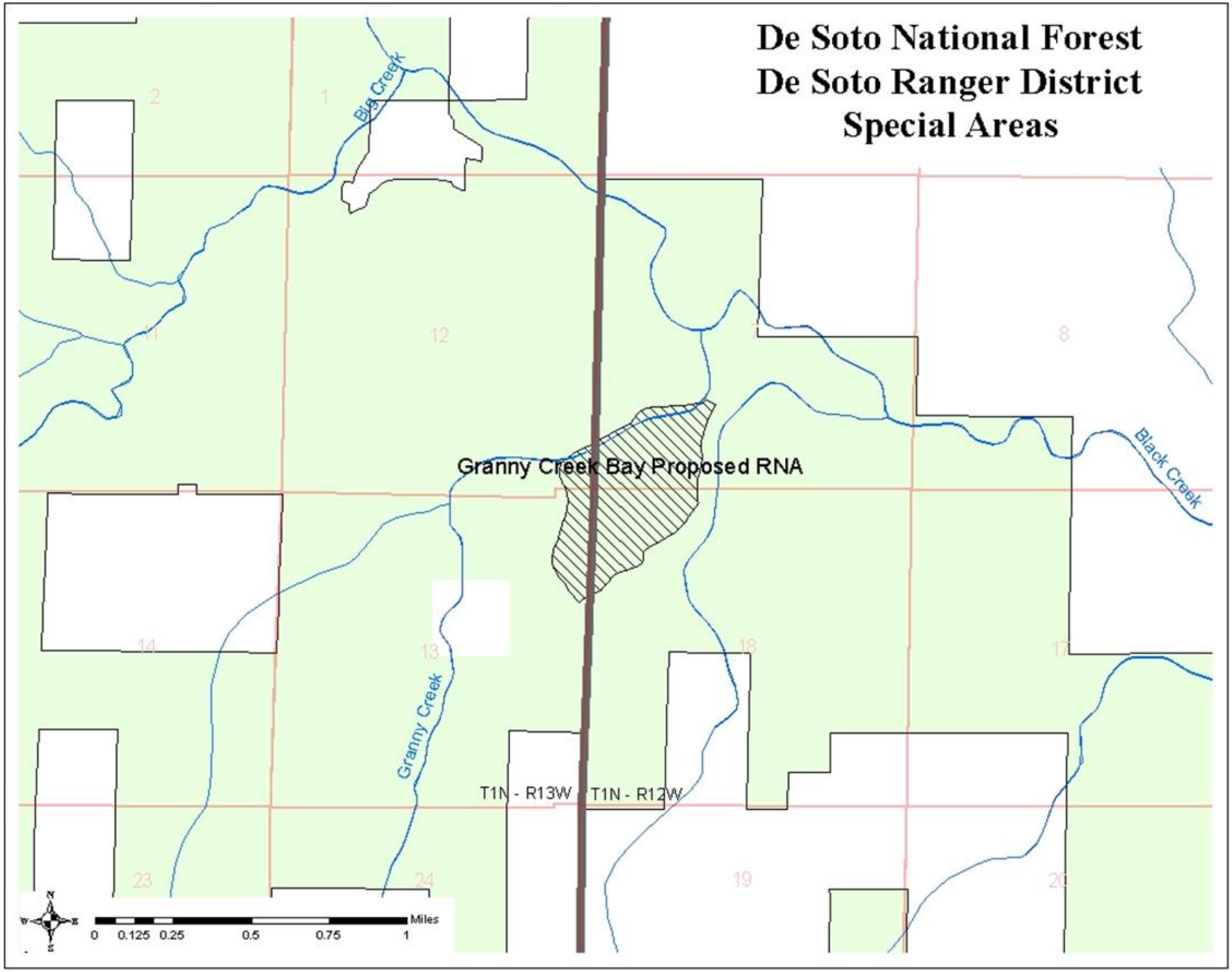
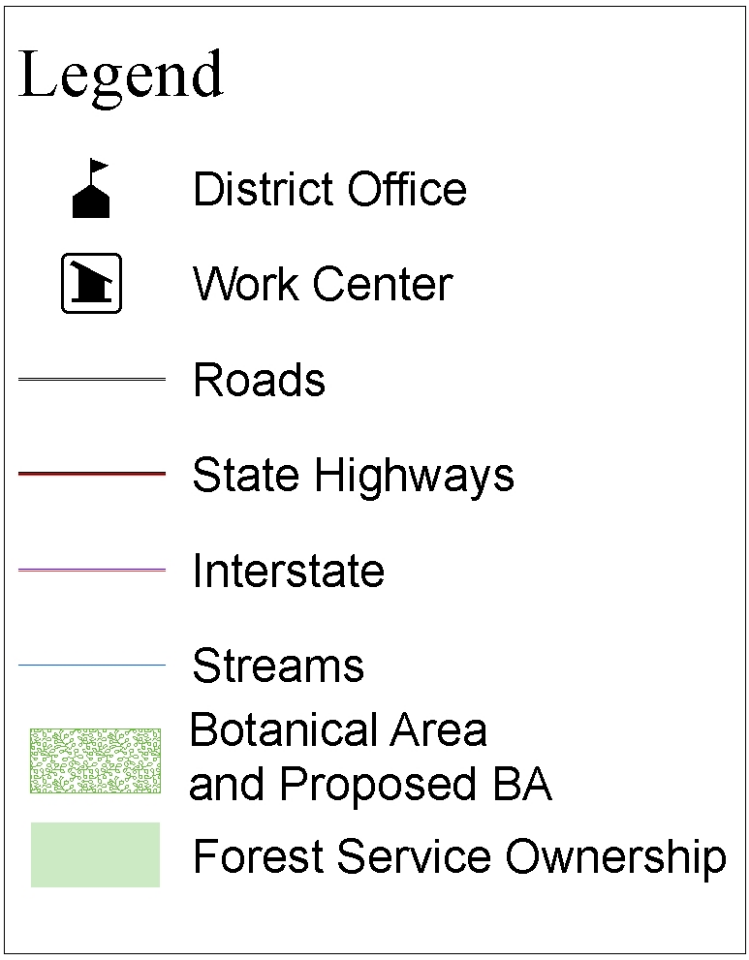


Figure D 42. Map of proposed Granny Creek Bay Research Natural Area

D.3.11 Proposed Wyatt Hills Botanical Area (De Soto Ranger District, De Soto National Forest):

The Wyatt Hills is an area of locally high topographic relief deeply dissected into narrow ridges, ravines, and bottomland forests along small creeks. It is notable for its woody plant diversity. Over 70 species of trees, shrubs and woody vines have been recorded, including 7 species of oak, 5 species of magnolia, 4 pines, 4 hollies, 4 blueberries, and 3 cat-briers. Florida anisetree is by far the most common shrub on slopes, with mountain laurel thickets along the ridge crests.



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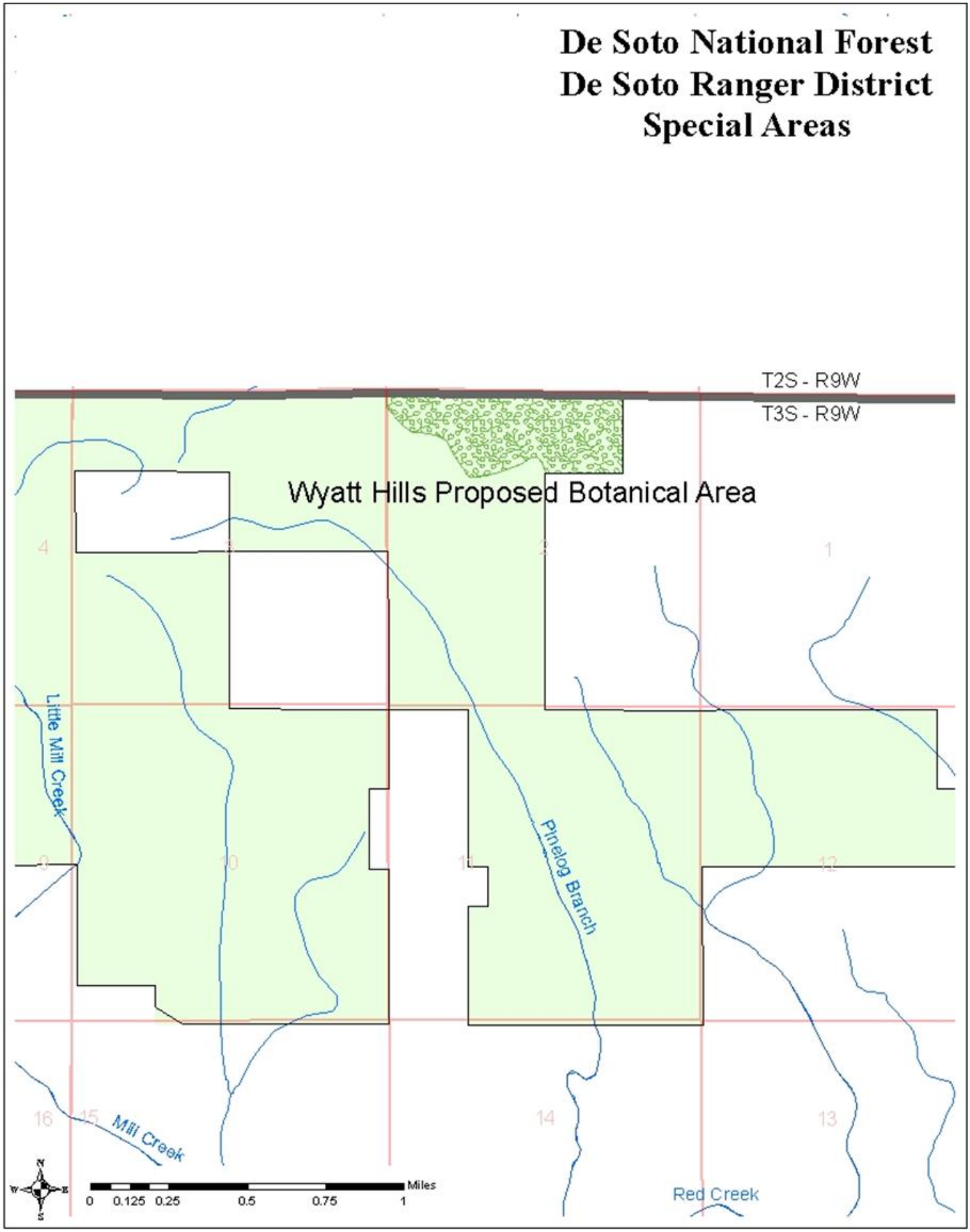
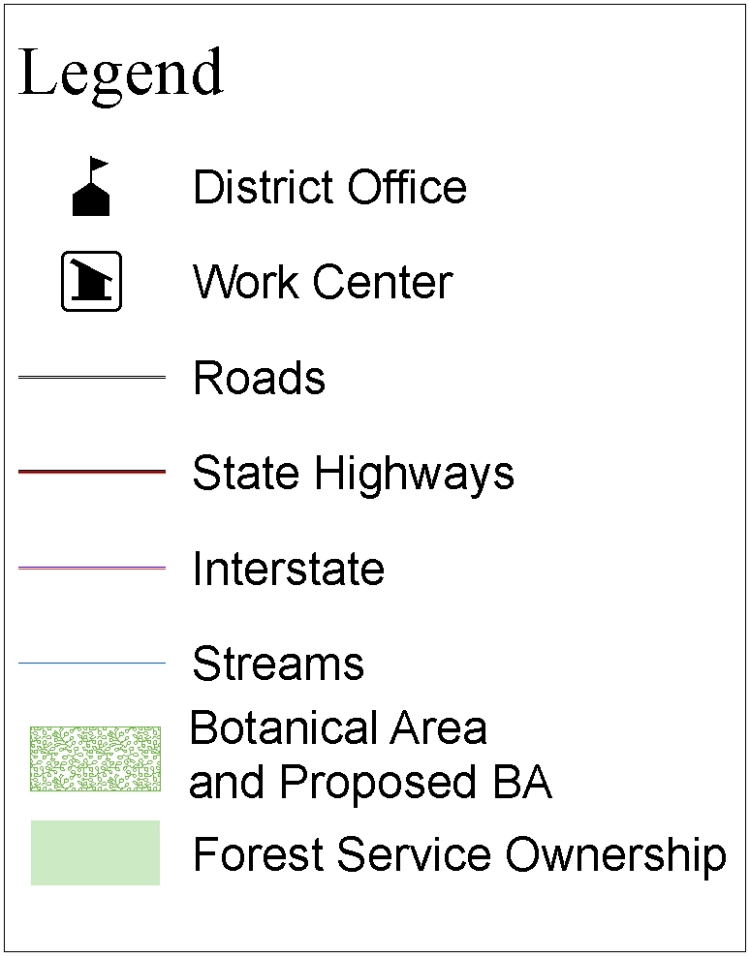


Figure D 43. Map of proposed Wyatt Hills Botanical Area

D.3.12 Proposed Cypress Bayou Botanical Area (Delta National Forest):

The Cypress Bayou Botanical Area is a tract of old growth delta bottomland hardwood forest dominated by overcup oak. Timber was established on the stand in 1874 and has not been cut since. Other dominant trees include green ash, sugarberry, bitter pecan, Nuttall oak and sweetgum.



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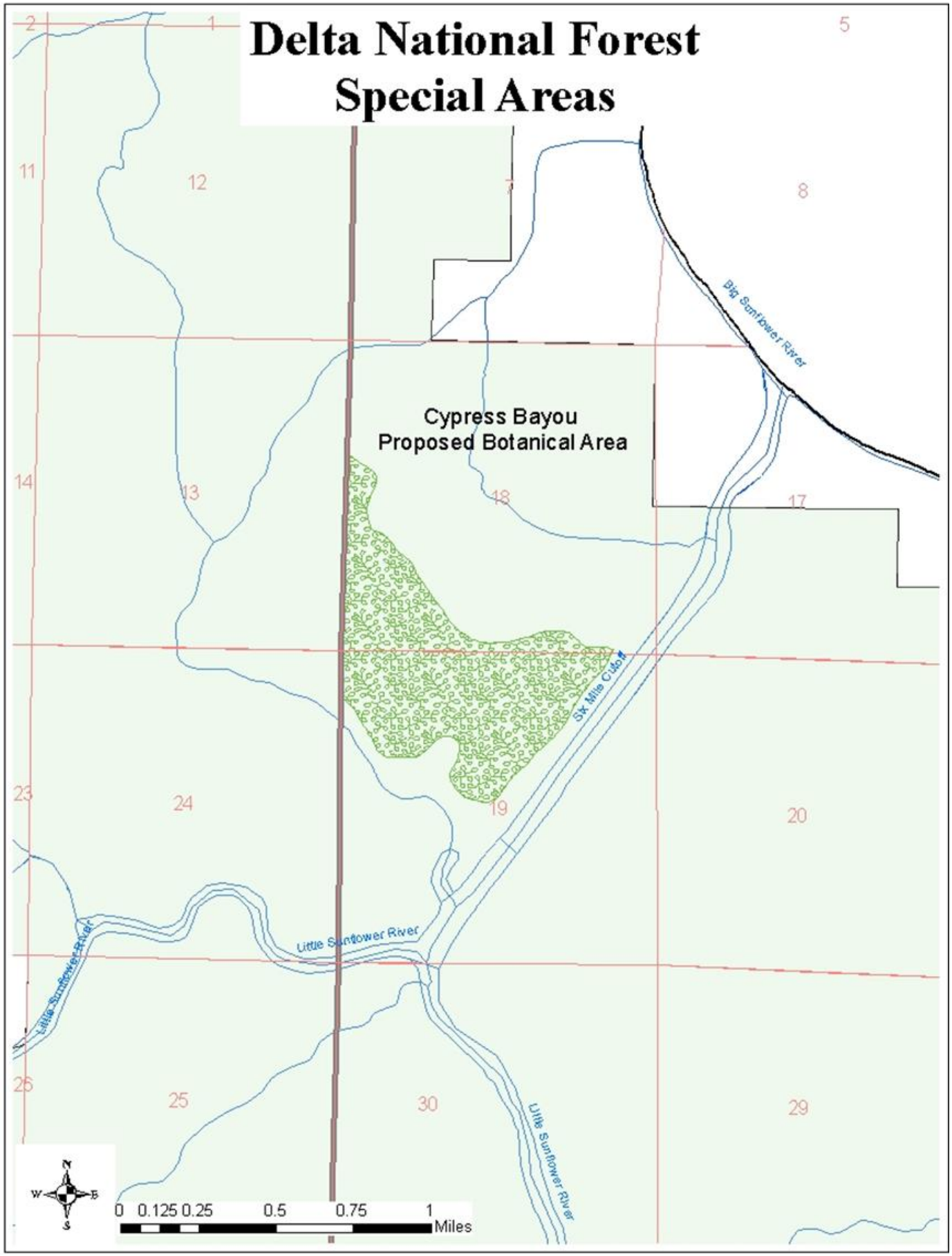
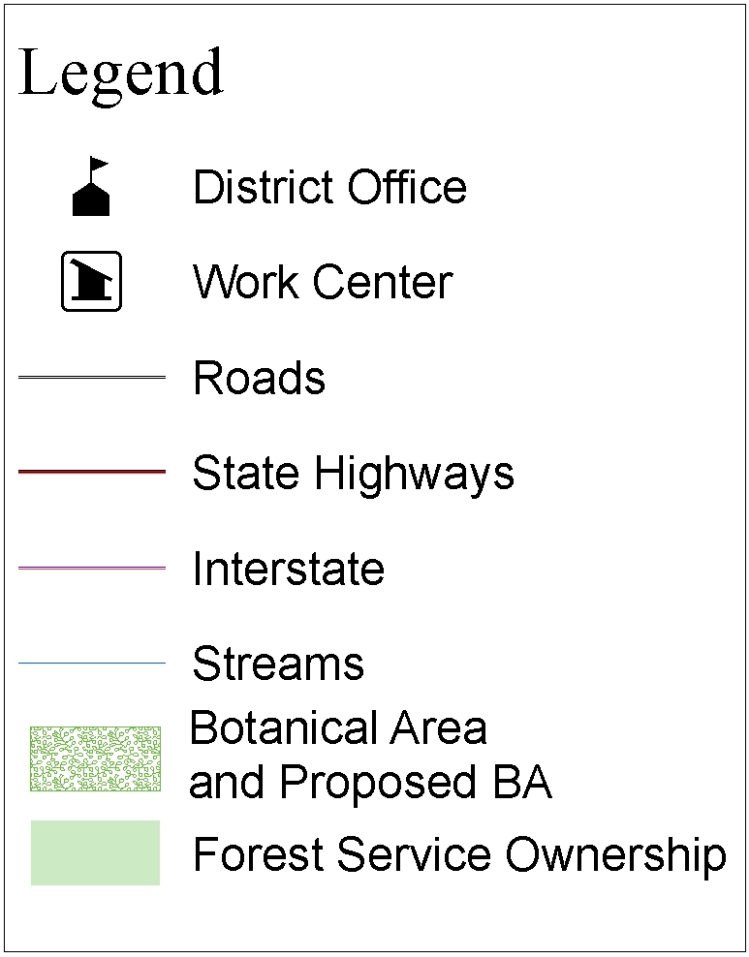


Figure D 44. Map of proposed Cypress Bayou Botanical Area

D.3.13 Proposed LA-2 Botanical Area (Holly Springs National Forest):

This is an area of old-growth hardwood forest in steep topography (Compartment 117, Stand 17) that was identified as being one of the best remaining areas of old-growth forest in Mississippi's lignite belt during a 1980s evaluation done by Dr. Frank Miller at Mississippi State University's remote sensing laboratory under contract to Mississippi Natural Heritage Program. The character of the area has changed significantly since its nomination due to flooding caused by beavers and subsequent tree mortality.



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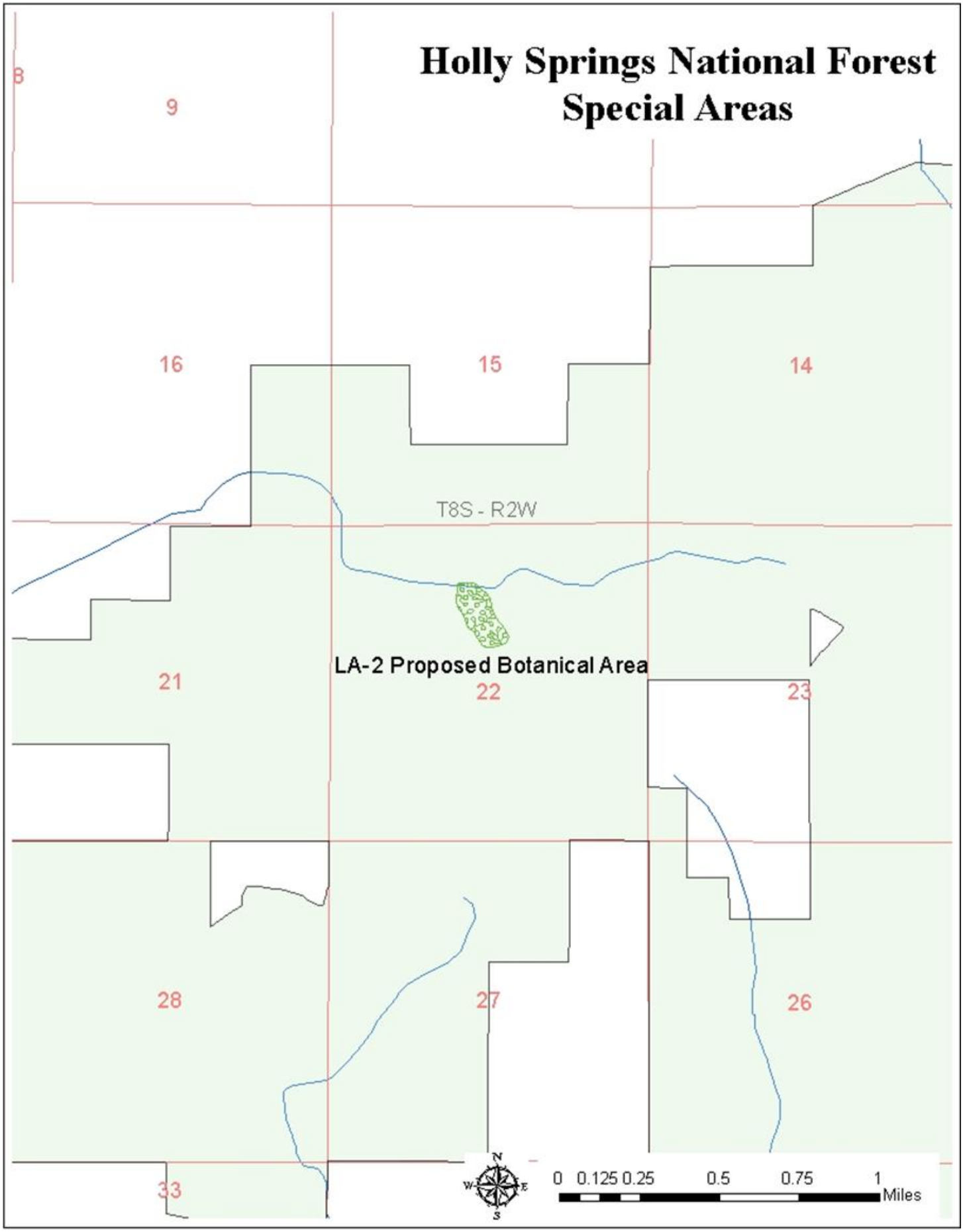
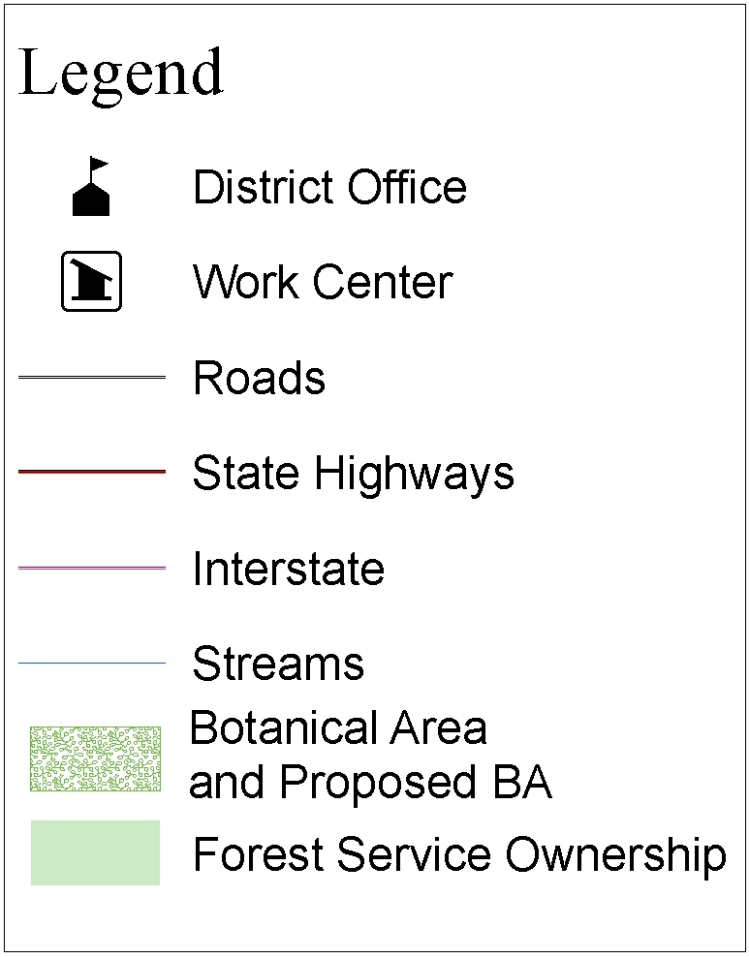


Figure D 45. Map of proposed LA-2 Botanical Area

D.3.14 Proposed LA-6 Botanical Area (Holly Springs National Forest):

This is an area of old-growth hardwood forest in steep topography that was identified as being one of the best remaining areas of old-growth forest in Mississippi's lignite belt during a 1980s evaluation done by Dr. Frank Miller at Mississippi State University's remote sensing laboratory under contract to Mississippi Natural Heritage Program.



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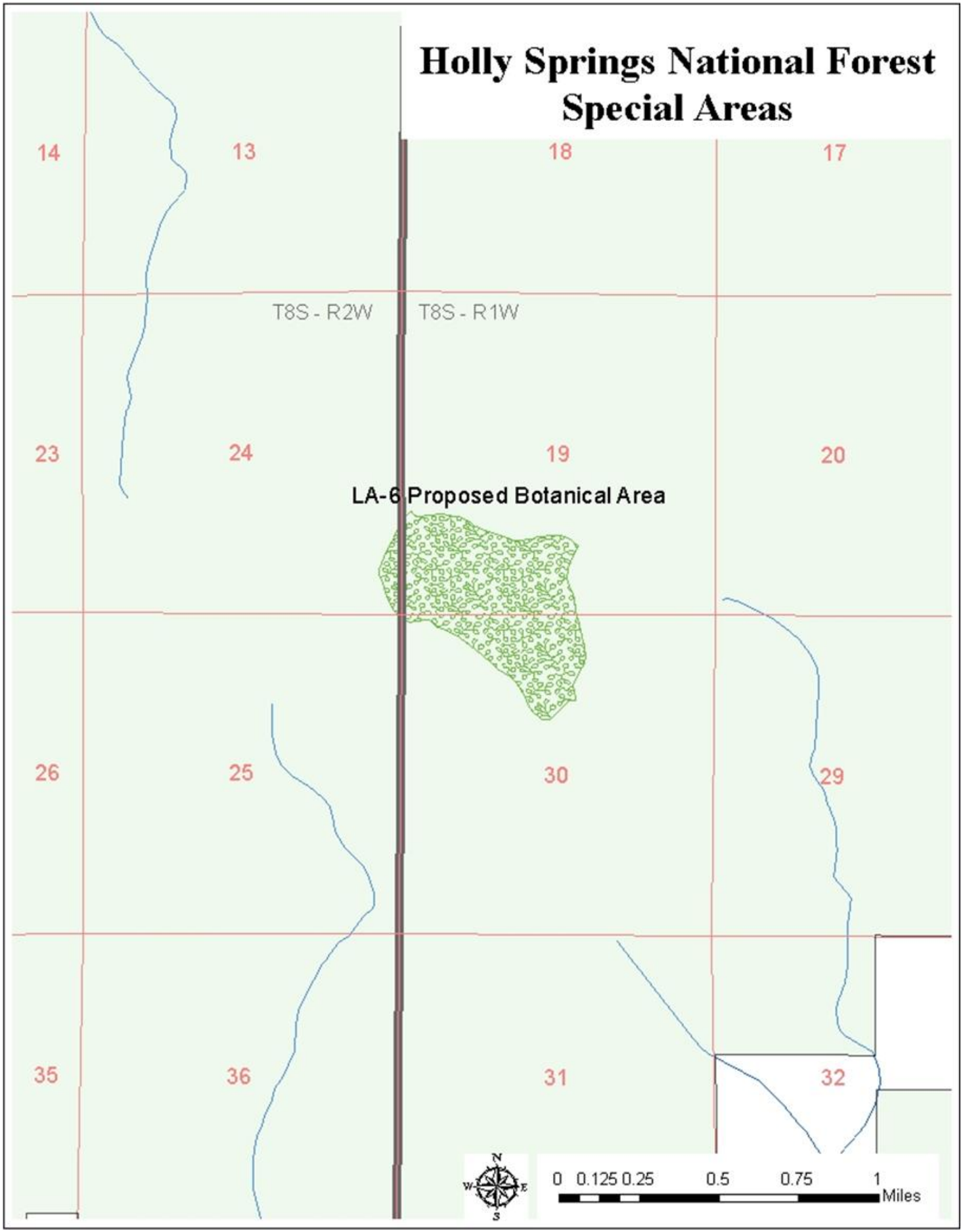
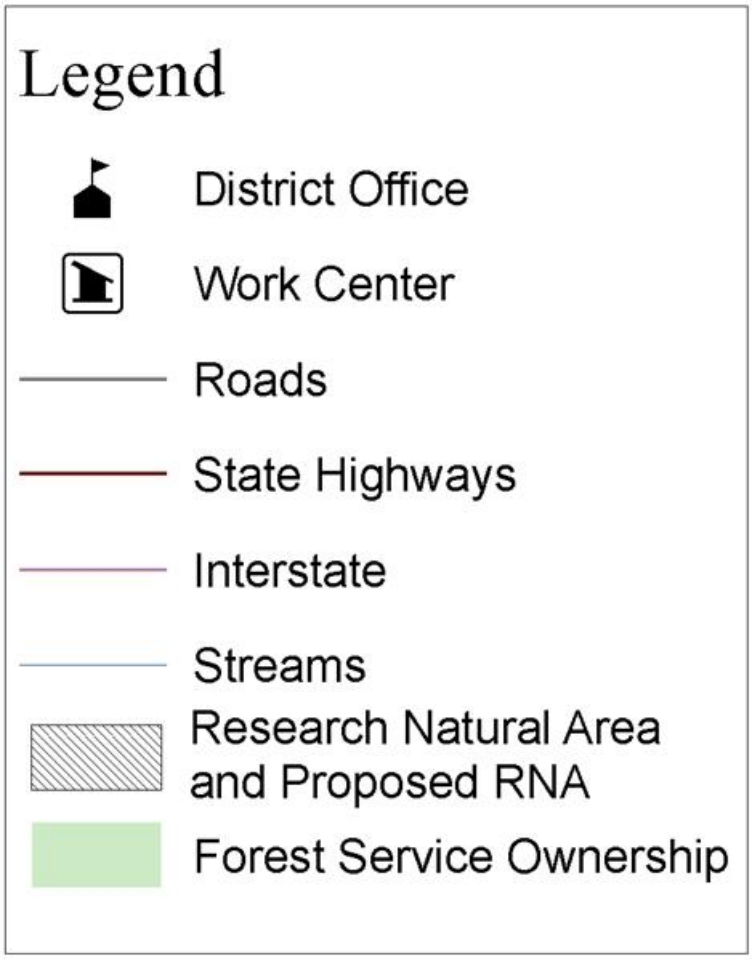


Figure D 46. Map of proposed LA-6 Botanical Area

D.3.15 Proposed Lee Creek Research Natural Area (Holly Springs National Forest):

This area was nominated for inclusion in the research natural area designation because of an approximately 10 acre area of undisturbed back water cypress which is very rare. Because of the small size of the cypress stand additional area from the alluvial floodplain adjacent to Lee Creek to the adjacent mixed shortleaf upland hardwood stand above the cypress stand was included to both buffer the cypress stand and provide research natural area representation of both minor stream bottom hardwoods and upland pine hardwood forest types in the research natural area system. The head cutting condition of Lee Creek was a negative issue found with field review of the site. But, it was determined the site should continue through the designation process. Subsequently the entire area was demolished by tornado. The damage included nearly complete breakage of all the cypress stems in the core area of interest. The area was salvaged and reforested following the storm damage. Because of the changed condition this area has been dropped from research natural area consideration.



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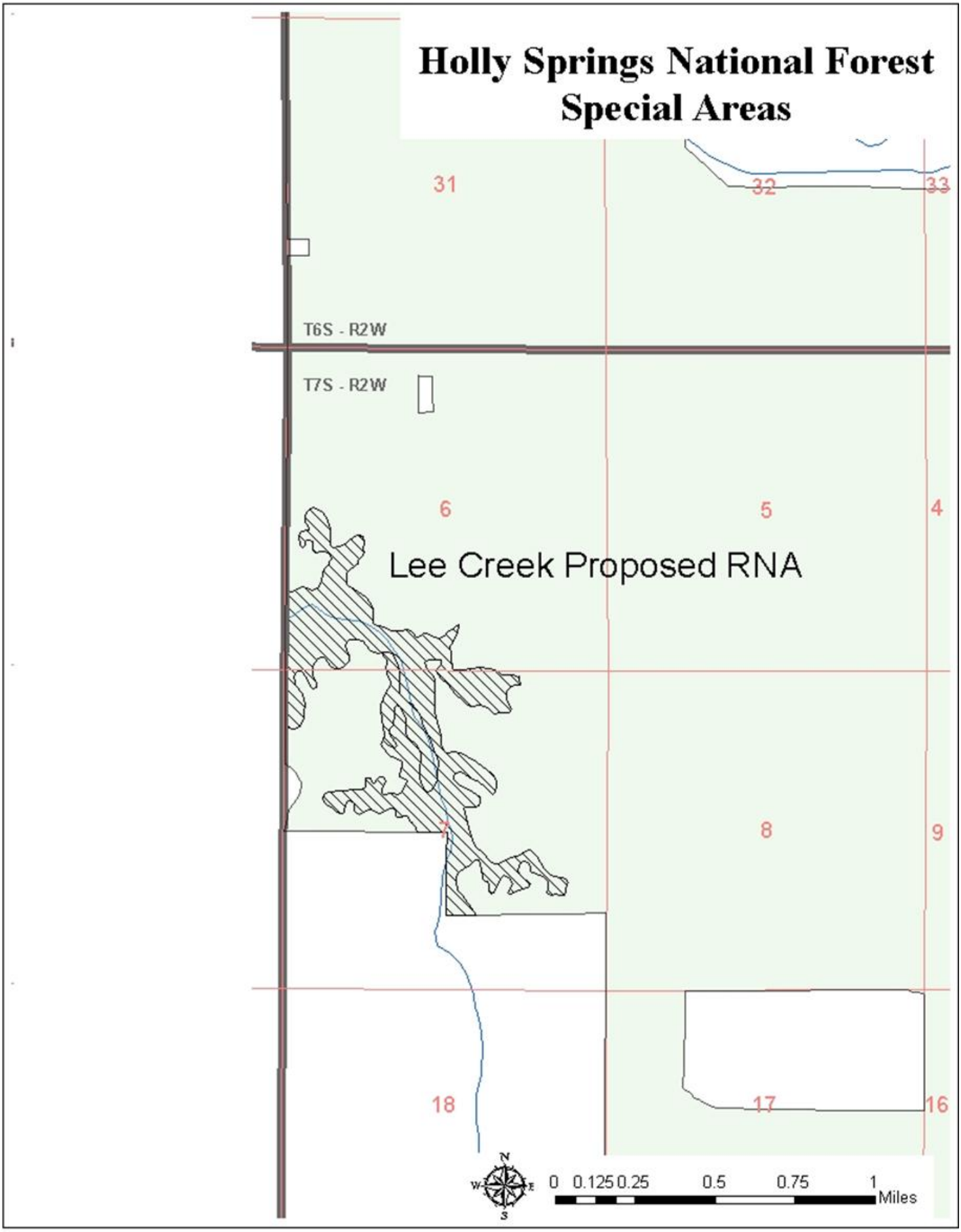
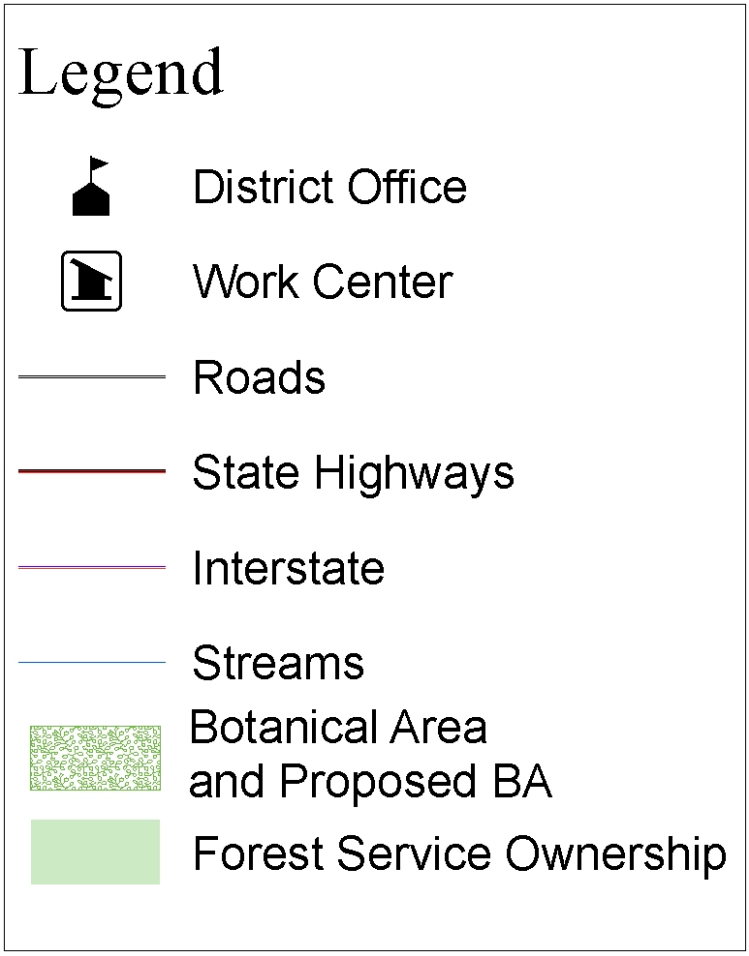


Figure D 47. Map of proposed Lee Creek Research Natural Area

D.3.16 Proposed Sandy Creek Botanical Area (Homochitto National Forest):

This is an area of mesic to dry mesic loessal forest. Dominant species are various hardwoods with scattered loblolly pine that are dropping out of the stand as the stand ages. The stand is about 70 years old. As a proposed botanical area, this area provides undisturbed base line sites on which to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved. This area is within the area of Sandy Creek studied through the Rare II process. This area was proposed by district staff for research natural area designation after the initial Rare II consideration. The botanical area designation was chosen as the best way to provide special area status for this area.



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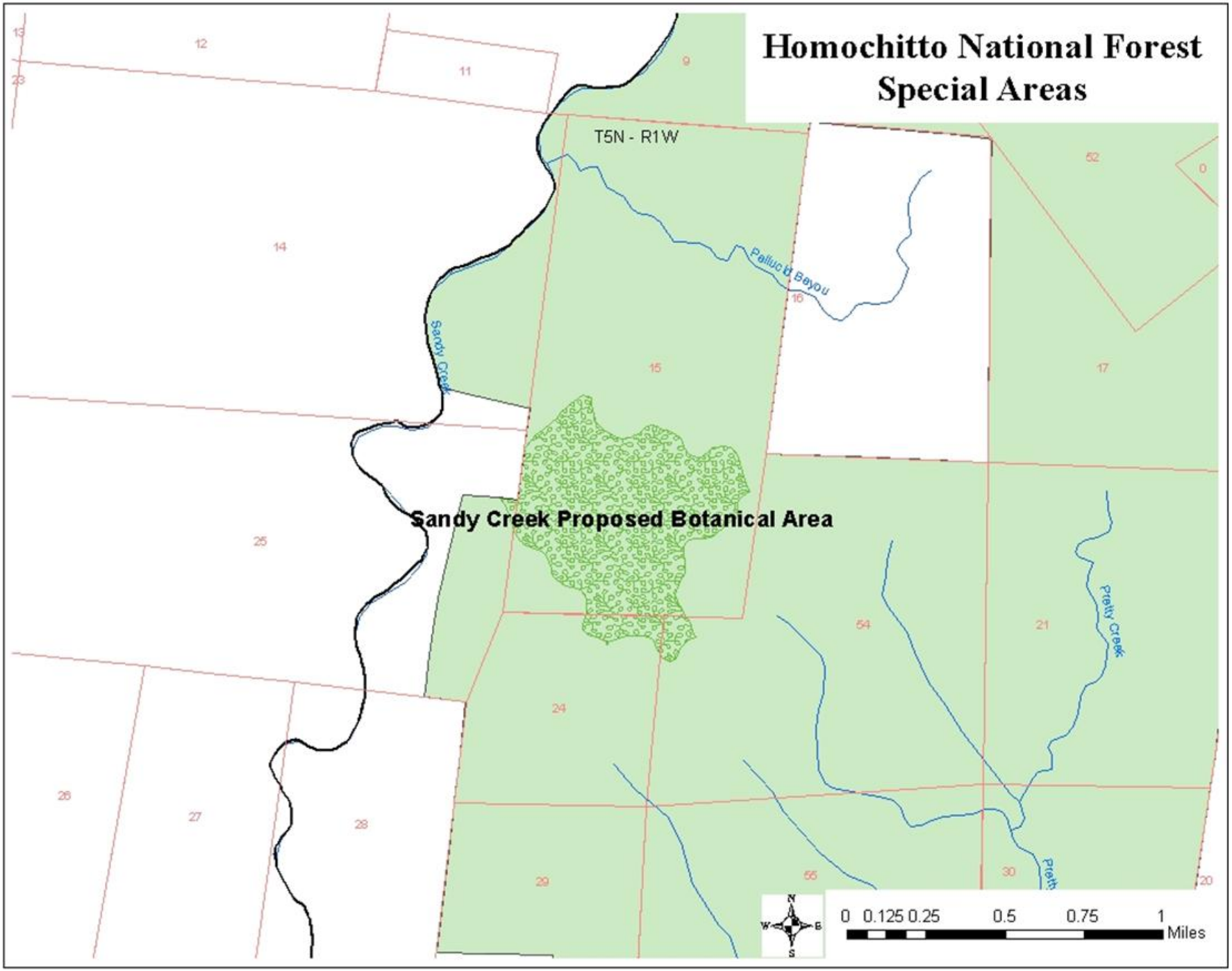
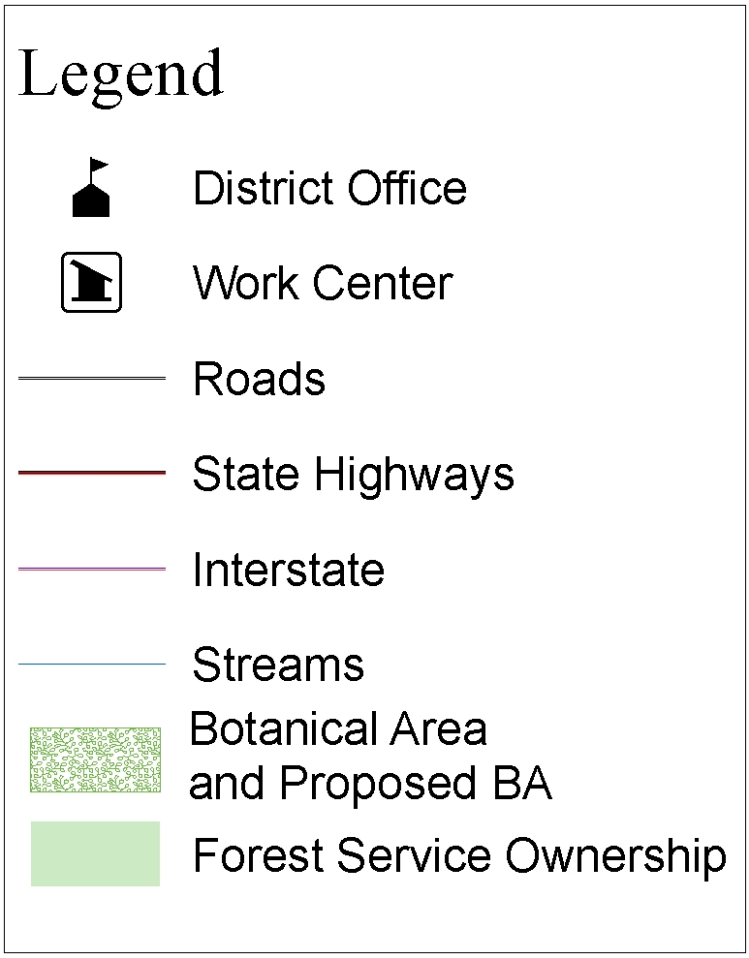


Figure D 48. Map of proposed Sandy Creek Botanical Area

D.3.17 Proposed Shagbark Hickory Botanical Area (Tombigbee National Forest):

The Shagbark Hickory Botanical Area is an area of mesic hardwood in steep highly dissected terrain that had been utilized as outdoor classroom for many years by professors and students of Mississippi State University. This area provides educational opportunities as an outdoor classroom for future students and professors.



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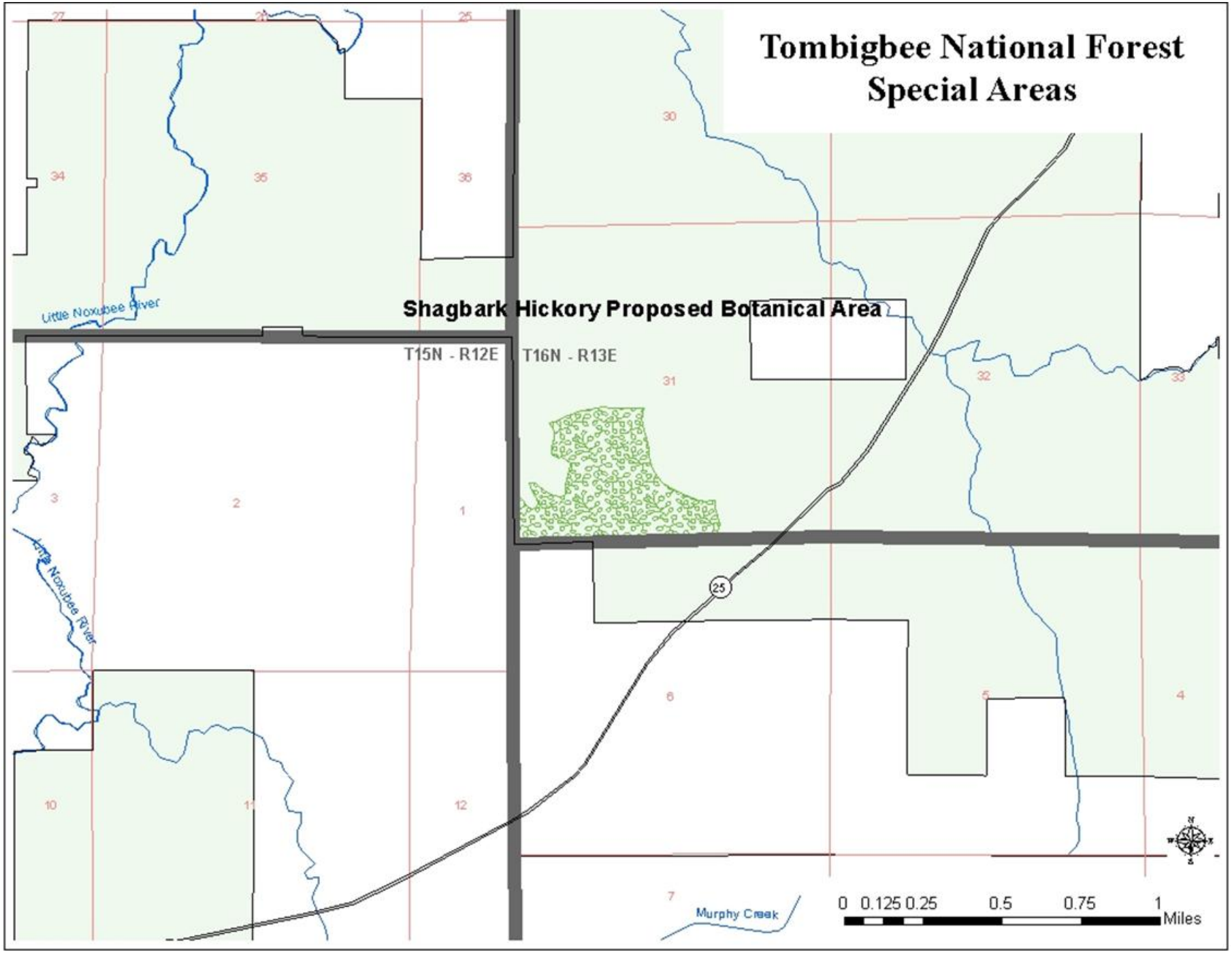
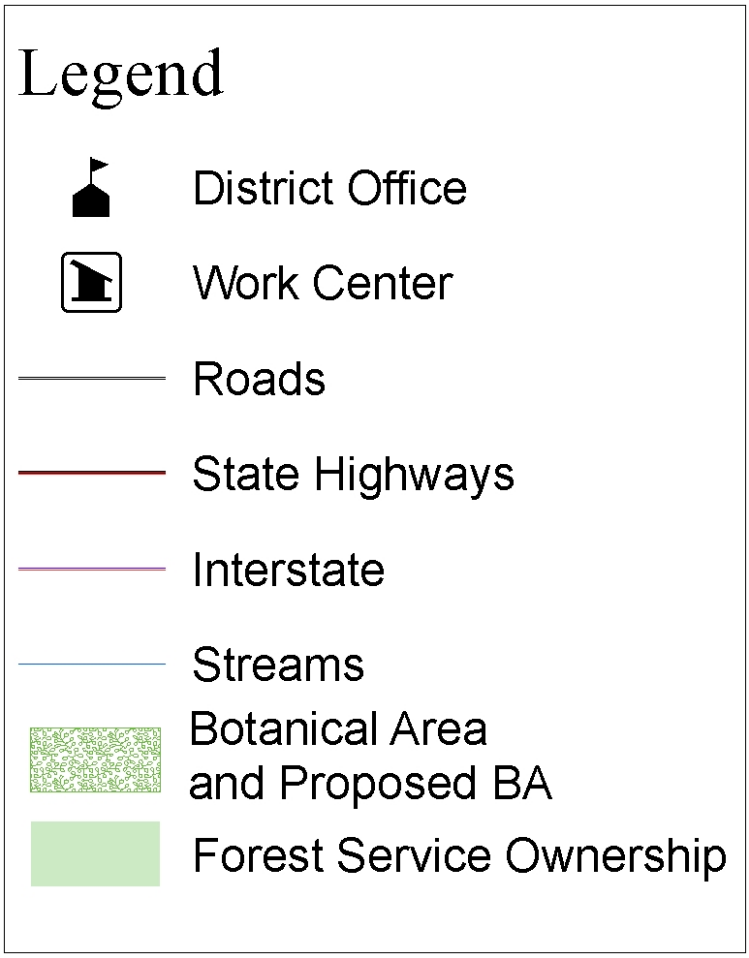


Figure D 49. Map of proposed Shagbark Hickory Botanical Area

D.3.18 Proposed Choctaw #4 Botanical Area (Tombigbee National Forest):

This is an area of old growth hardwood forest in steep topography that was identified as being one of the best remaining areas of old-growth forest in Mississippi's lignite belt during a 1980s evaluation done by Dr. Frank Miller at Mississippi State University's remote sensing laboratory under contract to Mississippi Natural Heritage Program.



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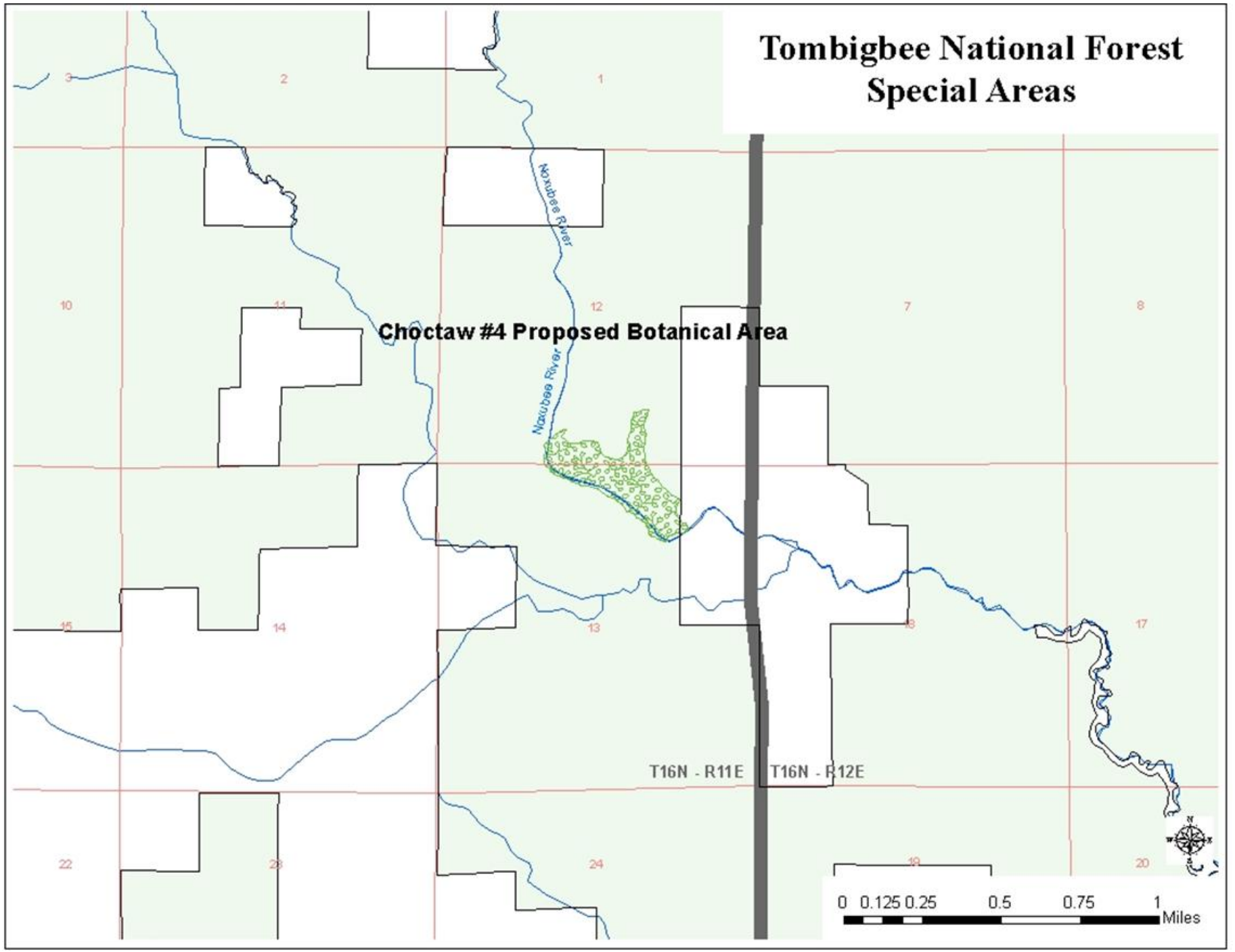
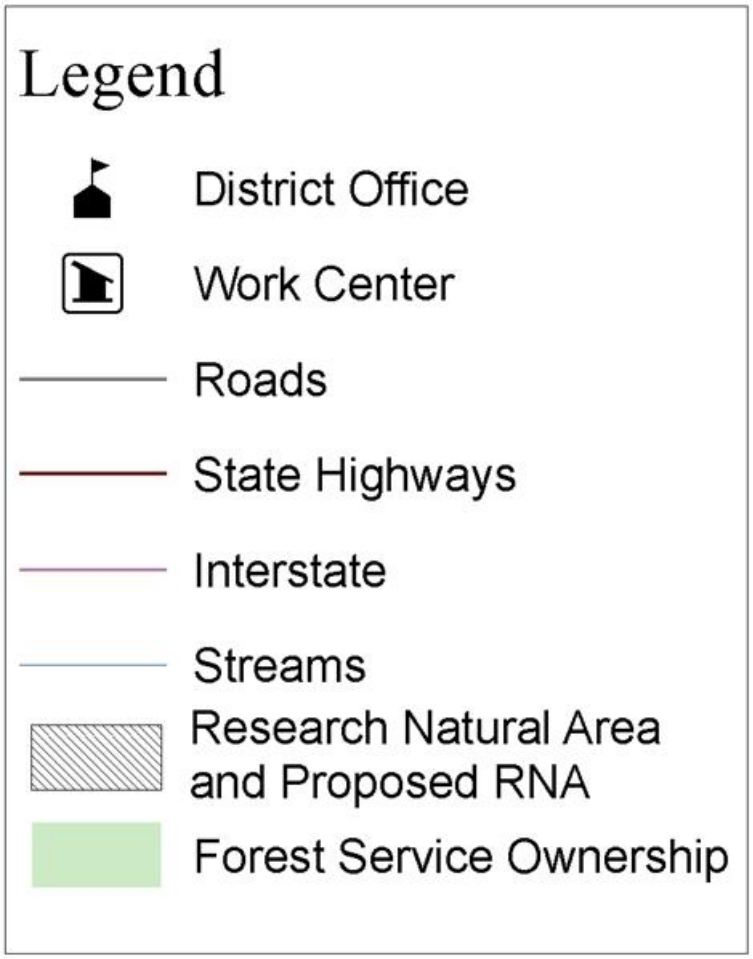


Figure D 50. Map of proposed Choctaw #4 Botanical Area

D.3.19 Proposed Prairie Mount Botanical Area (Tombigbee National Forest):

This area was originally proposed by district staff for research natural area designation. The botanical area designation was chosen as the best way to provide special area status for this area. The Prairie Mount Botanical Area represents a good example of the native tall grass prairie from the black belt region. The black belt prairie provides the necessary habitat conditions to support a full array of native prairie species such as indiangrass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, prairie cone-flowers, and others. As a proposed botanical area, this area provides undisturbed base line sites on which to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved.



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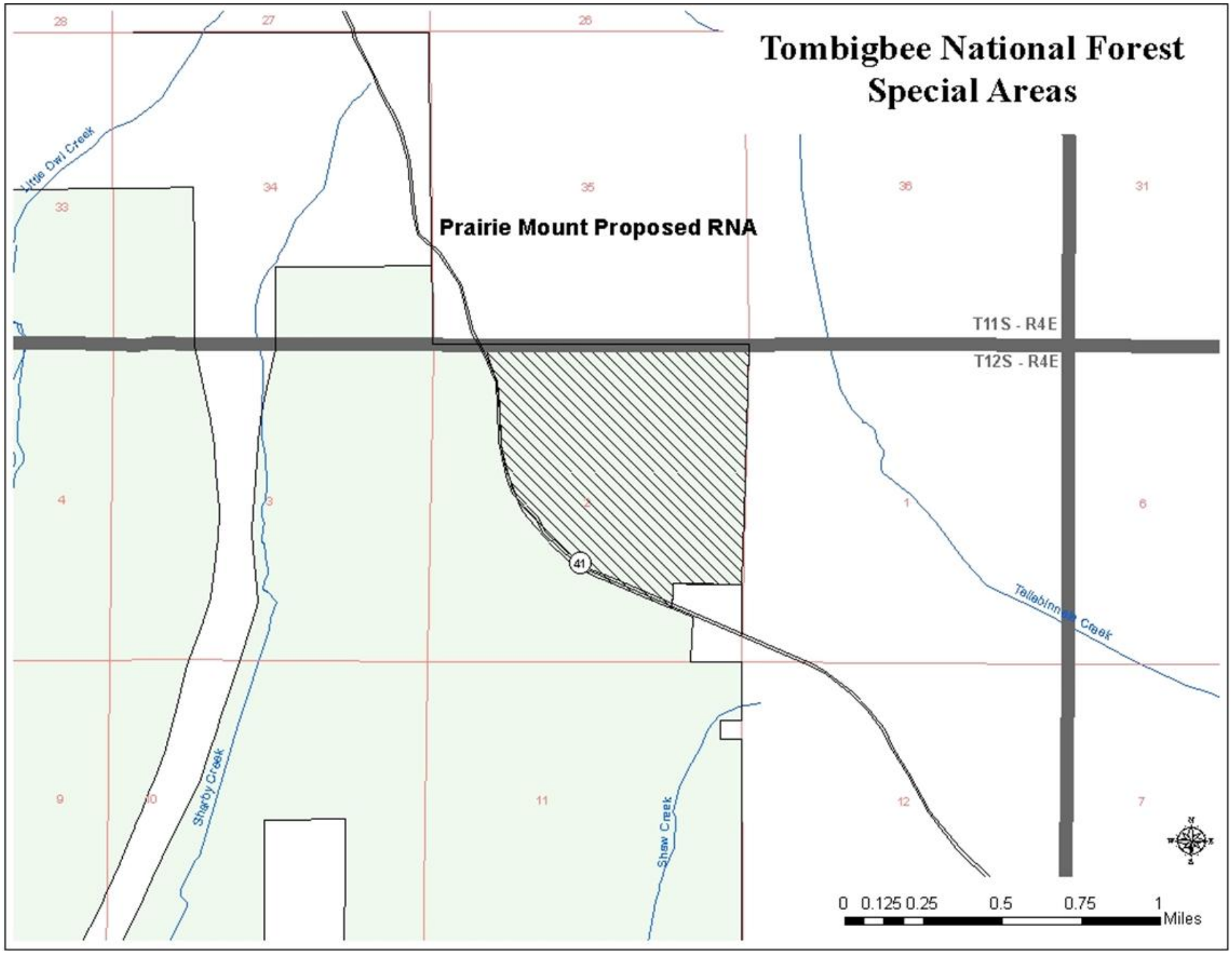
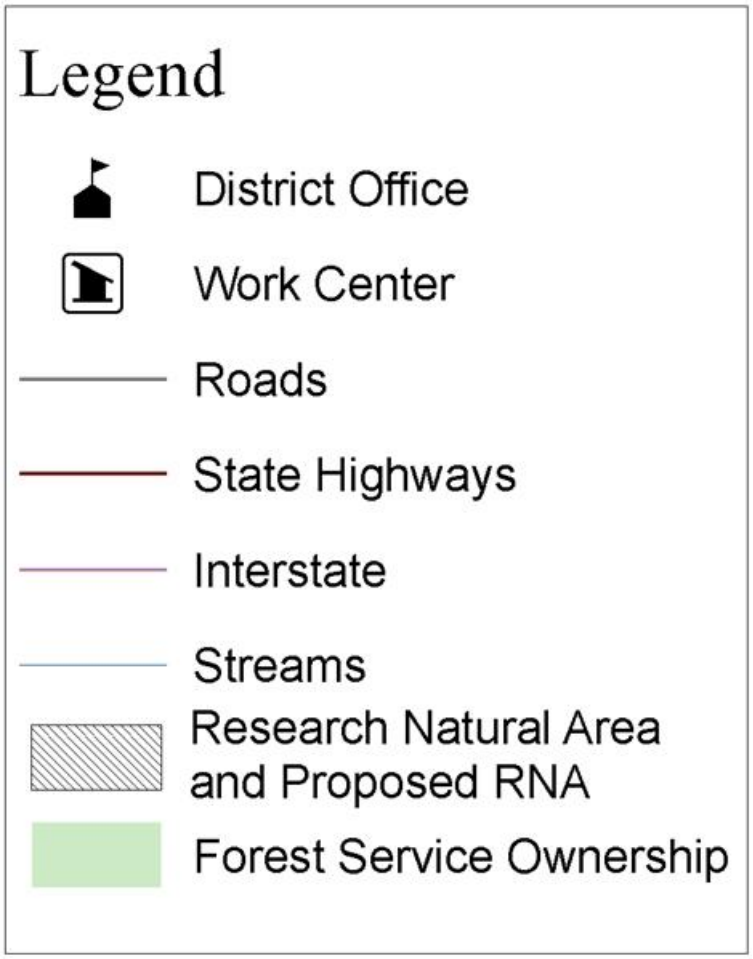


Figure D 51. Map of proposed Prairie Mount Research Natural Area - Botanical Area

D.3.20 Proposed Bogue Cully Botanical Area (Tombigbee National Forest):

This area was originally proposed by district staff for research natural area designation. The botanical area designation was chosen as the best way to provide special area status for this area. The Bogue Cully Research Natural Area represents a good example of the native tall grass prairie from the black belt region. The black belt prairie provides the necessary habitat conditions to support a full array of native prairie species such as Indian grass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, prairie cone-flowers, and others. As a proposed botanical area, this area provides undisturbed base line sites on which to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved.



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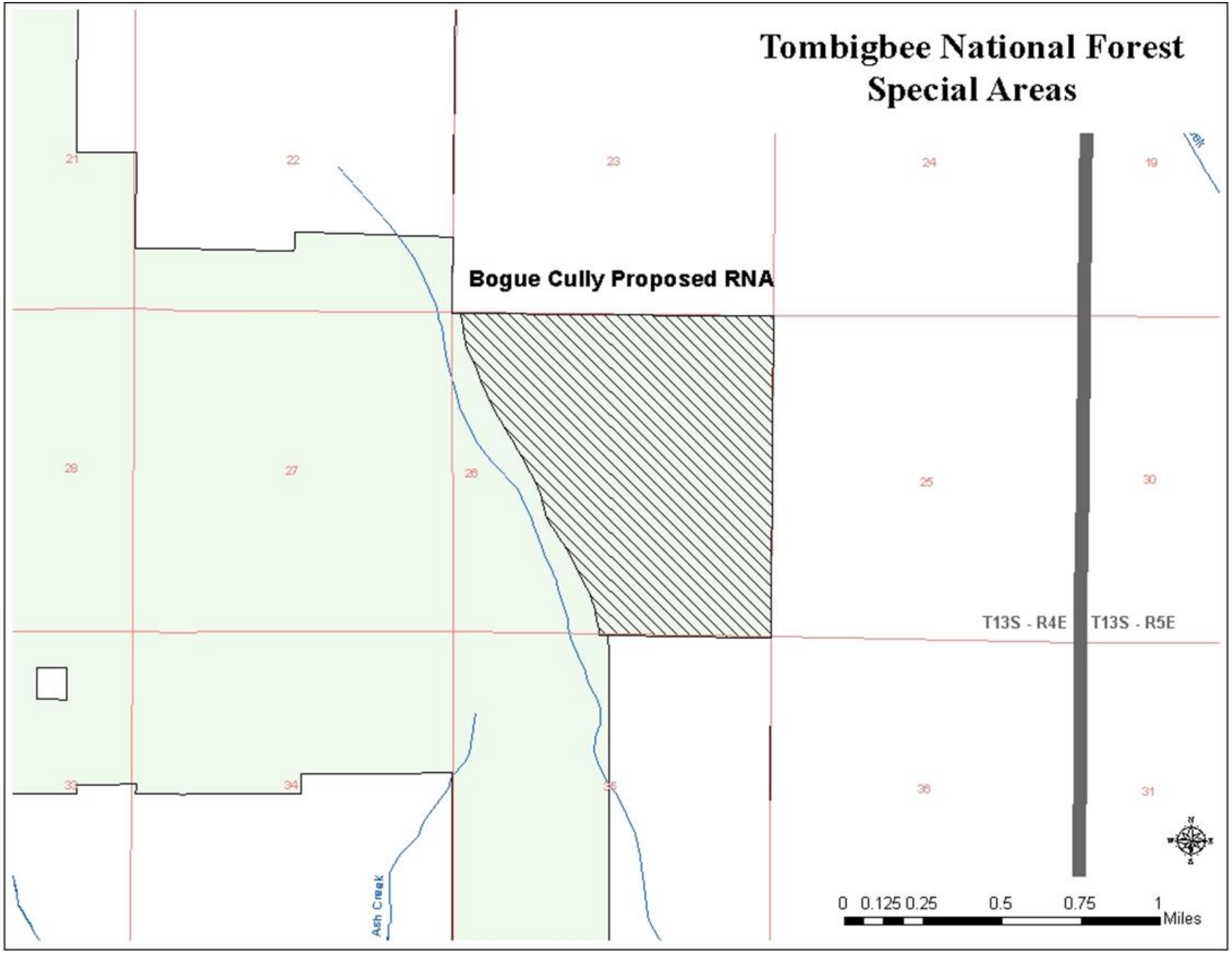

Figure D 52. Map of proposed Bogue Cully Research Natural Area - Botanical Area

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Appendix E -
Watershed Analysis:
Determining Watershed Condition for Aquatic Sustainability and Cumulative Effects at the Planning Level for National Forests in Mississippi

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Appendix E
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Appendix E - Watershed Analysis: Determining Watershed Condition for Aquatic Sustainability and Cumulative Effects at the Planning Level for National Forests in Mississippi

E.1 Introduction

This process paper is twofold; 1) it describes a process to address the cumulative effects of management activities on watershed condition. This fulfills a portion of the ecological condition requirement (specifically the watershed condition) and 2) addresses potential aquatic sustainability over time. This fulfills the determination of sustainable populations within the planning area.

E.1.1 Background

Aquatic habitats are unique in that they are primarily found in and adjacent to streams and lakes. The mobility of aquatic species is usually limited to these habitats. Habitat alteration is the major cause of decline of aquatic diversity in the South. Channelization, impoundment, sedimentation, and flow alterations are the most common physical habitat alterations associated with the decline of aquatic species (Walsh et al. 1995; Etnier 1997; Burkhead et al. 1997). Other human-induced impacts to aquatic species include pollution, introduced species, and over-harvesting (Miller 1989).

Habitat quality within a freshwater ecosystem is determined by activities within the watershed (Abell et al. 2000; Scott and Helfman 2002). Therefore, the influence of these activities upon habitats, or waterbodies, can be described to determine the condition of the habitat. The evaluation areas for aquatic species at the forest plan level are 5th level hydrologic units (watersheds are used interchangeable with hydrologic units).

There are 288 freshwater fish species in Mississippi (Ross, 2001); thus, it is impossible to determine sustainability for each individual species. As a surrogate, the sustainability of proposed, endangered, threatened, sensitive, and locally rare (PETS-LR) aquatic species are assessed and threats to their sustainability determined. Other wide-ranging generalist aquatic species are not considered at risk. If the habitat sustainability of species with special habitat needs or concerns are maintained, then more wide-ranging generalist species' habitat needs will be met.

To determine if there is adequate habitat for these species, the condition of individual watersheds needs to be determined. Watershed condition is determined from the physical and anthropogenic interactions within the watershed. Ideally, watershed condition would be determined from stream surveys. However, the extent and detail required to address all watersheds, including private land, with stream surveys is not reasonable or available. To address habitat condition at the watershed level it is necessary to determine values from geographic data. These values are compared among the watersheds, and a condition or set of conditions is determined.

E.1.2 Methods

Watershed Condition

Hydrologic units or watersheds are defined as areas that drain to a common point. Fifth-level watersheds range between 40,000 and 250,000 acres. These units are queried against other geographic information layers. These layers include ownership, streams, roads, point sources, dams, and landuse.

These layers were intersected with the 5th level watersheds and determined as a percent of the watershed or as a density (e.g. miles per square mile). The following table shows the data layers, their use, source, and unit of measurement:

Table E 1. GIS data layers used for this analysis and their use, source and units of measure

Layers	Use	Source	Unit
watersheds	The planning unit	USFS	5th level HU
ownership	To determine the extend and location of Forest Service ownership within the watershed	USFS	percent
streams	To determine riparian areas	EPA River Reach files ver. 3	not applicable
roads	To determine watershed road density and riparian road density	Tiger census data	miles per square mile
landuse	To determine watershed and riparian area landuse	NLCD	percent
dams	To determine altered flow	EPA Basins III	number per square mile
point sources	To address point sources	EPA Basins III	number per square mile

This process was modified from the East-wide Assessment Protocol for Forest Plan Amendment, Revision, and Implementation (USDA Forest Service 2000). Individual condition factors were valued one to five (five being the best) identified by Jenk's optimization (natural breaks). This method identifies breaks between classes using a statistical formula (Jenk's optimization) within ArcView 3.2a. These values (or average of combined of values) were used to determine a range of conditions for each metric. This allows for a numerical ranking of condition among the watersheds. However, it does not suggest that a watershed with a score of 4 is twice as good as a watershed of 2, only that the watershed with a value of 4 is above average and the watershed with a value of 2 is below average.

The metrics and combinations of data used determine the metrics are outlined in the following list:

1. Sedimentation was assessed separately by the determining the percent increase above the baseline sediment levels by watershed as assessed with the Watershed Condition Ranking (WCR). This process is described in detail in the Fish Assemblage – Sediment Profile and Sediment Yield sections.
2. Point Source Pollutants (density of point sources).
3. Riparian Habitat (road density in the riparian area, and percent forest in the riparian area).
4. Altered stream flow (density of dams, road density in the riparian, and density of road crossings).

Each Forest identified the presence of PETS-LR species for each 5th level watershed across the planning area. These databases were combined into a single database and stressors assigned using area experts.

For each watershed and species, sensitivity to condition categories was assigned based on the species sustainability evaluation database, published literature and personal communications (USDA NF in Mississippi 2008). Species sensitivity to the four condition categories was compared with the condition of their respective watersheds to determine the threats to their persistence in the planning area.

Specific information is not available for the relation of individual species to point source, riparian habitat, or altered flows. Therefore, related groups were identified by Jenks Optimization to address this issue. This allows for a comparison of conditions among watersheds found on the forest. Additional information is available from the expert panels. The relationship of fish communities to anthropogenic sediment increases is definable and is discussed further in the Fish Assemblage – Sediment Profile section. Threats to aquatic species sustainability are not limited to these four variables; however, GIS coverages are not available for channelization, introduced species, and over-harvest. These and additional issues or threats were addressed by expert panels and can be found in the NFMS ESE, (2005).

Analysis results

The following tables display the results of the watershed condition assessment. Raw values as well as ranks (based on Jenks optimization for natural breaks) are provided. As discussed earlier risk levels or thresholds are not available for point sources, riparian health or hydrologic modification. Information related to these categories allows for a discussion of the ranges of modification and the relative position of individual watersheds within those ranges.

Table E 2. Watershed breakdown – ownership, use, modifications other than roads

5th Level Watershed Number	5th Level Watershed Name	Square Miles	Acres	% National Forest	% Forested Land use	% Agriculture And Urban	% Riparian Area Forested	Rcris	Pcs	Mines	Ifd	Dams	Point Per Sq Mile	Dams Per Sq Mile
				percent				number					#/sq mi	
316010203	Tallabinnela Creek	73.86	47,267	0.7443151	36.0	64.3	36.9			4		3	0.09	0.04
316010401	Upper Chuquatonchee Creek	207.43	132,757	9.4221938	43.2	56.3	46.2			1		23	0.59	0.11
316010402	Cane Creek - Houlka Creek	238.34	152,539	9.1496305	55.0	45.1	55.4	5	3	3	4	10	0.46	0.04
316010801	Sand Creek - Noxubee River	250.71	160,456	25.0882371	84.7	15.0	83.1	8		10	5	25	1.68	0.10
316010803	Yellow Creek - Noxubee River	159.57	102,125	0.0397210	72.8	27.2	69.0				1	16	0.03	0.10
317000301	Maynor Creek - Big Creek	145.51	93,126	23.6936720	89.1	10.1	94.7	2				2	0.67	0.01
317000302	Mason Creek - Big Creek	187.34	119,896	18.1292958	93.2	6.6	97.4					5	0.21	0.03
317000303	Byrd Creek - Chickasawhay River	134.82	86,285	7.4108859	91.7	7.2	94.4	1				2	0.07	0.01
317000304	Green Creek - Chickasawhay River	194.04	124,184	0.0202079	92.0	6.9	91.4	2	1		2	12	0.02	0.06
317000401	Ichusa Creek - Leaf River	210.48	134,708	25.8729840	84.4	15.5	87.4	5	1			11	1.09	0.05
317000402	Quarterliah Creek - West Tallaha	169.74	108,632	30.0858922	83.9	16.1	88.3		1	2		2	0.65	0.01
317000403	Hatchapaloo Creek - Oakohay Cree	246.20	157,568	14.8022501	77.0	22.6	85.9		1	2	2	8	0.37	0.03
317000501	Terrapin Creek - Tallahoma Creek	214.16	137,065	0.0000015	73.6	26.5	83.0	4	2	1	3	19	0.00	0.09
317000503	Heidelberg - Bogue Homo	278.27	178,091	5.7757628	81.0	18.8	90.5	4	3	1	7	25	0.03	0.09
317000504	Tiger Creek - Bogue Homo	142.99	91,515	28.1132869	89.2	10.5	92.6			1	1	7	0.39	0.05
317000505	Little Thompson Creek - Thompson	226.80	145,153	30.0838501	88.3	10.8	94.3			1	1	10	0.50	0.04
317000507	Piney Woods Creek - Gaines Creek	142.41	91,142	23.6066192	90.2	9.4	96.4					3	0.28	0.02
317000508	Beaumont - Leaf River	241.53	154,581	17.9745679	78.6	22.2	82.8	24	6	12	22	23	0.32	0.10
317000509	Leaf River - Atkinson Creek	152.13	97,366	11.5422400	94.0	5.7	97.4				1	3	0.20	0.02
317000601	Big Cedar Creek - Pascagoula Riv	315.00	201,599	14.7029714	80.1	19.0	92.1	1		2	2	13	0.08	0.04

5th Level Watershed Number	5th Level Watershed Name	Square Miles	Acres	% National Forest	% Forested Land use	% Agriculture And Urban	% Riparian Area Forested	Rcris	Pcs	Mines	Ifd	Dams	Point Per Sq Mile	Dams Per Sq Mile
				percent				number					#/sq mi	
317000602	Bluff Creek - Moungers Creek	134.36	85,991	5.7646570	90.1	8.4	89.7				1	4	0.09	0.03
317000701	Little Black Creek - Black Creek	339.63	217,366	1.9117714	72.3	27.7	88.4	1	4	1	8	31	0.03	0.09
317000702	Beaverdam Creek - Black Creek	223.41	142,981	54.4581315	89.8	10.2	95.5	9	1			7	1.07	0.03
317000703	Flint Creek - Red Creek	305.61	195,591	9.8745269	76.8	23.0	89.5	8	2	4	10	26	0.20	0.09
317000704	Bluff Creek - Red Creek	184.97	118,378	30.9576686	90.2	9.5	94.6			1		9	0.44	0.05
317000705	Hickory Creek - Black Creek	213.04	136,346	50.8409772	94.3	5.1	95.0	2				1	0.94	0.00
317000807	Black Creek - Escatawpa River	240.43	153,873	0.0261794	69.1	29.5	82.5	1			2		0.00	-
317000902	Crane Creek - Wolf River	159.91	102,340	0.0828552	73.3	24.7	81.5			3	1	9	0.01	0.06
317000905	Little Biloxi River - Biloxi Riv	270.26	172,964	15.3811346	85.8	13.8	93.3	3	3	7	6	26	0.14	0.10
317000906	Tuxachanie Creek - Tchoutacabouf	243.39	155,768	47.2183369	90.1	9.0	93.3	3	2		4	1	0.24	0.00
318000103	Tallahaga Creek	127.91	81,860	0.1564614	69.8	30.8	78.2	2	5	3	9	13	0.05	0.10
318000107	Sipsey Creek - Tuscolameta Creek	318.60	203,901	2.8533655	71.6	28.4	79.3	3	3		5	24	0.07	0.08
318000108	Shockaloo Creek - Tuscolameta Cr	249.24	159,517	13.5913156	72.1	27.8	80.7	4			1	27	0.16	0.11
318000109	Tibby Creek - Yockanookany River	286.91	183,623	0.0488731	85.4	14.6	83.8	2	1	4	5	11	0.04	0.04
318000201	Coffee Bogue - Pearl River	348.52	223,052	9.9839324	73.4	26.7	83.2			1	2	6	0.07	0.02
318000202	Pelahatchie Creek	237.32	151,883	0.6660393	72.1	28.6	78.5	5	6	4	6	14	0.01	0.06
318000205	Raspberry Creek - Strong River	317.14	202,967	19.1493078	76.8	23.1	84.4		1	2	1	11	0.49	0.03
801020706	Hurricane Creek - Muddy Creek	118.67	75,948	5.5852600	61.5	38.3	57.4	1	3	19	4	20	0.26	0.17
801020801	Porters Creek - Hatchie River	60.32	38,605	1.5336539	75.6	24.4	65.4	2		1	1	20	0.07	0.33
801021001	Indian Creek - Wolf River	216.92	138,830	8.8666459	67.3	32.6	79.4	2	1	17	3	29	0.42	0.13
803020102	Cane Creek - Mud Creek	87.40	55,934	1.8084615	44.5	55.1	43.0			47		3	0.17	0.03
803020103	Cypress Creek - Little Tallahatc	455.04	291,226	12.4659084	64.4	35.7	56.5	12	5	97	10	60	0.53	0.13

5th Level Watershed Number	5th Level Watershed Name	Square Miles	Acres	% National Forest	% Forested Land use	% Agriculture And Urban	% Riparian Area Forested	Rcris	Pcs	Mines	Ifd	Dams	Point Per Sq Mile	Dams Per Sq Mile
				percent				number					#/sq mi	
803020104	Shelby Creek - Tippah River	153.72	98,383	17.0458393	70.7	29.5	58.3	3	1	50	4	26	0.75	0.17
803020105	Snow Creek - Tippah River	221.95	142,047	33.0759576	78.2	21.8	75.1		2	69	4	38	1.32	0.17
803020106	Sardis Lake - Little Tallahatchi	450.30	288,191	2.3811215	74.1	25.2	70.8	2	2	11	1	51	0.13	0.11
803020203	Tillatoba Creek - Panola Quitman	222.15	142,174	3.5667312	50.5	49.7	49.1	1			2	32	0.16	0.14
803020301	Burney Branch - Yocona River	272.72	174,539	5.6012545	72.0	28.1	67.6	6	4	73	5	32	0.26	0.12
803020303	Bynum Creek - Yocona River	220.61	141,193	1.6735268	67.4	31.4	61.0					7	0.05	0.03
803020401	Lee Creek - Coldwater River	176.06	112,677	0.5145512	52.1	48.2	60.7	2		4	2	6	0.01	0.03
803020504	Persimmon Creek - Skuna River	382.39	244,730	5.3808627	70.3	29.4	63.1	2	1	2	1	43	0.19	0.11
803020506	Cane Creek - Yalobusha River	192.89	123,451	0.2650476	63.4	36.9	65.2	1	5	2	6	11	0.03	0.06
803020716	Silver Creek - Big Sunflower Riv	263.88	168,881	11.6592008	28.1	72.0	48.6		1			6	0.07	0.02
803020718	Big Sunflower River - Little Sun	224.63	143,765	27.5069312	53.6	46.2	62.6				1	3	0.12	0.01
803020800	Collins Creek - Yazoo River	196.86	125,990	1.3044888	63.7	36.6	66.3	5	3	1	6	2	0.02	0.01
806020301	Foster Creek - Bayou Pierre	377.51	241,605	0.3319052	78.6	21.5	81.4	11	5	5	3	13	0.02	0.03
806020305	Willis Creek - Little Bayou Pier	302.17	193,389	2.4048973	75.0	25.0	81.8	2			5	16	0.09	0.05
806020501	McCall Creek - Homochitto River	429.06	274,600	19.4966603	83.6	16.1	81.7	2		1	3	12	0.65	0.03
806020502	Middle Fork Homochitto River - H	386.31	247,241	35.1902295	90.2	9.0	85.6	2			2	5	0.53	0.01
806020503	Wells Creek - Homochitto River	407.63	260,884	17.1360895	81.2	18.3	82.5		3	4	2	27	0.17	0.07
806020601	Upper Buffalo River	142.07	90,923	0.8929649	89.3	10.4	90.3	1				2	0.04	0.01
806020602	Middle Buffalo River	104.59	66,935	0.4416352	92.6	7.1	89.9		2			2	0.02	0.02
807020201	West Fork Amite River	189.40	121,216	0.1606239	72.1	28.0	76.9	4			1	7	0.05	0.04
807020203	Woodland Creek - Beaver Creek	104.58	66,933	0.0085504	72.8	27.4	79.2		3		3	4	0.04	0.04

Table E 3. Watershed breakdown – roads, crossings, and watershed condition ranking

5th Level Watershed Number	5th Level Watershed Name	Riparian Road Density	Stream Crossing Density	Watershed Level Road Density	% US Forest Service	% Forested	% Ag Urban	% Rip Forest Lu	# Pt Source Sq Mi	# Dams Sq Mi	Riparian Rd Density	# Rd Crossing Density	Ws Road Density	Overall Watershed Condition	Risk levels for sediment (low, moderate, high)	Rank for Point Source Pollutants	Rank for Riparian Health	Rank for Hydrologic Modification
					rank (1-5 with 1 being the worst)											rank (1-5)		
					Watershed condition													
316010203	Tallabinnela Creek	1.09	1.57	2.31	1	1	1	1	5	4	1	1	2	2.00	High	5	1	2.00
316010401	Upper Chuquatonchee Creek	0.76	1.10	1.70	2	1	1	1	2	2	3	3	4	2.13	High	2	2	2.67
316010402	Cane Creek - Houlka Creek	0.91	1.62	2.06	2	2	2	2	3	4	2	1	3	2.38	Moderate	3	2	2.33
316010801	Sand Creek - Noxubee River	0.61	0.95	1.81	4	4	4	3	1	2	4	3	4	3.13	Low	1	3.5	3.00
316010803	Yellow Creek - Noxubee River	0.59	0.95	1.56	1	3	3	2	5	2	4	3	4	3.25	Moderate	5	3	3.00
317000301	Maynor Creek - Big Creek	0.49	0.74	2.17	4	5	5	5	2	5	4	4	2	4.00	Moderate	2	4.5	4.33
317000302	Mason Creek - Big Creek	0.53	0.75	2.17	3	5	5	5	4	4	4	4	2	4.13	Moderate	4	4.5	4.00
317000303	Byrd Creek - Chickasawhay River	0.59	0.97	2.28	2	5	5	5	5	5	4	3	2	4.25	Moderate	5	4.5	4.00
317000304	Green Creek - Chickasawhay River	0.66	0.82	2.28	1	5	5	5	5	3	3	4	2	4.00	Moderate	5	4	3.33
317000401	Ichusa Creek - Leaf River	0.73	1.07	1.78	4	4	4	4	1	3	3	3	4	3.25	Low	1	3.5	3.00
317000402	Quarterliah Creek - West Tallaha	0.56	0.88	1.40	4	4	4	4	2	5	4	4	5	4.00	Moderate	2	4	4.33
317000403	Hatchapaloo Creek - Oakohay Cree	0.77	1.15	2.11	3	4	3	4	3	4	3	2	3	3.25	Moderate	3	3.5	3.00
317000501	Terrapin Creek - Tallahoma Creek	1.09	1.60	2.66	1	3	3	3	5	2	1	1	1	2.38	High	5	2	1.33
317000503	Heidelberg - Bogue Homo	0.86	1.29	2.63	2	4	4	4	5	2	2	2	1	3.00	High	5	3	2.00
317000504	Tiger Creek - Bogue Homo	0.70	0.91	1.83	4	5	5	5	3	3	3	3	4	3.88	Moderate	3	4	3.00
317000505	Little Thompson Creek - Thompson	0.52	0.82	1.81	4	5	5	5	3	3	4	4	4	4.13	High	3	4.5	3.67
317000507	Piney Woods Creek - Gaines Creek	0.55	0.96	2.19	4	5	5	5	4	5	4	3	2	4.13	Moderate	4	4.5	4.00
317000508	Beaumont - Leaf River	1.41	2.21	3.42	3	4	3	3	4	2	1	1	1	2.38	High	4	2	1.33

5th Level Watershed Number	5th Level Watershed Name	Riparian Road Density	Stream Crossing Density	Watershed Level Road Density	% US Forest Service	% Forested	% Ag Urban	% Rip Forest Lu	# Pt Source Sq Mi	# Dams Sq Mi	Riparian Rd Density	# Rd Crossing Density	Ws Road Density	Overall Watershed Condition	Risk levels for sediment (low, moderate, high)	Rank for Point Source Pollutants	Rank for Riparian Health	Rank for Hydrologic Modification
					rank (1-5 with 1 being the worst)											rank (1-5)		
					Watershed condition													
317000509	Leaf River - Atkinson Creek	0.47	0.76	2.20	2	5	5	5	4	5	4	4	2	4.25	Moderate	4	4.5	4.33
317000601	Big Cedar Creek - Pascagoula Riv	0.63	0.93	2.22	3	4	4	5	5	4	4	3	2	3.88	Moderate	5	4.5	3.67
317000602	Bluff Creek - Moungers Creek	0.72	1.12	2.61	2	5	5	4	5	4	3	3	1	3.75	High	5	3.5	3.33
317000701	Little Black Creek - Black Creek	0.75	1.01	2.58	1	3	3	4	5	2	3	3	1	3.00	High	5	3.5	2.67
317000702	Beaverdam Creek - Black Creek	0.66	0.80	2.23	5	5	5	5	1	4	3	4	2	3.63	High	1	4	3.67
317000703	Flint Creek - Red Creek	0.70	1.07	2.47	2	3	3	4	4	2	3	3	2	3.00	High	4	3.5	2.67
317000704	Bluff Creek - Red Creek	0.56	0.87	2.18	4	5	5	5	3	3	4	4	2	3.88	Moderate	3	4.5	3.67
317000705	Hickory Creek - Black Creek	0.25	0.45	1.53	5	5	5	5	2	5	5	5	5	4.63	Low	2	5	5.00
317000807	Black Creek - Escatawpa River	1.28	1.45	2.46	1	3	3	3	5	5	1	1	2	2.88	Moderate	5	2	2.33
317000902	Crane Creek - Wolf River	0.71	1.01	2.50	1	3	3	3	5	3	3	3	2	3.13	Moderate	5	3	3.00
317000905	Little Biloxi River - Biloxi Riv	0.83	1.26	2.65	3	4	4	5	4	2	2	2	1	3.00	Moderate	4	3.5	2.00
317000906	Tuxachanie Creek - Tchoutacabouf	0.73	0.94	2.60	5	5	5	5	4	5	3	3	1	3.88	Moderate	4	4	3.67
318000103	Tallahaga Creek	0.79	1.22	2.26	1	3	3	3	5	2	3	2	2	2.88	High	5	3	2.33
318000107	Sipsey Creek - Tuscolameta Creek	0.82	1.12	2.13	1	3	3	3	5	2	2	3	3	3.00	High	5	2.5	2.33
318000108	Shockaloo Creek - Tuscolameta Cr	0.74	1.06	2.01	3	3	3	3	4	2	3	3	3	3.00	High	4	3	2.67
318000109	Tibby Creek - Yockanookany River	0.81	1.18	2.02	1	4	4	3	5	4	2	2	3	3.38	Moderate	5	2.5	2.67
318000201	Coffee Bogue - Pearl River	0.87	1.01	1.85	2	3	3	3	5	5	2	3	4	3.50	High	5	2.5	3.33
318000202	Pelahatchie Creek	0.87	1.34	2.39	1	3	3	3	5	3	2	2	2	2.88	High	5	2.5	2.33
318000205	Raspberry Creek - Strong River	0.74	1.08	1.95	3	3	3	4	3	4	3	3	3	3.25	High	3	3.5	3.33

5th Level Watershed Number	5th Level Watershed Name	Riparian Road Density	Stream Crossing Density	Watershed Level Road Density	% US Forest Service	% Forested	% Ag Urban	% Rip Forest Lu	# Pt Source Sq Mi	# Dams Sq Mi	Riparian Rd Density	# Rd Crossing Density	Ws Road Density	Overall Watershed Condition	Risk levels for sediment (low, moderate, high)	Rank for Point Source Pollutants	Rank for Riparian Health	Rank for Hydrologic Modification
					rank (1-5 with 1 being the worst)											rank (1-5)		
					Watershed condition													
801020706	Hurricane Creek - Muddy Creek	0.90	1.38	2.14	2	2	2	2	4	1	2	2	3	2.25	Moderate	4	2	1.67
801020801	Porters Creek - Hatchie River	0.42	0.88	2.00	1	3	3	2	5	1	4	4	3	3.13	Low	5	3	3.00
801021001	Indian Creek - Wolf River	0.72	0.94	2.07	2	3	2	3	3	2	3	3	3	2.75	Moderate	3	3	2.67
803020102	Cane Creek - Mud Creek	0.72	1.32	1.81	1	2	1	1	4	4	3	2	4	2.63	High	4	2	3.00
803020103	Cypress Creek - Little Tallahatc	0.72	1.05	1.93	3	3	2	2	3	2	3	3	3	2.63	Moderate	3	2.5	2.67
803020104	Shelby Creek - Tippah River	0.85	1.13	2.42	3	3	3	2	2	1	2	3	2	2.25	Low	2	2	2.00
803020105	Snow Creek - Tippah River	0.59	0.64	1.91	4	4	4	3	1	1	4	4	3	3.00	Low	1	3.5	3.00
803020106	Sardis Lake - Little Tallahatchi	0.54	0.68	1.73	1	3	3	2	4	2	4	4	4	3.25	Moderate	4	3	3.33
803020203	Tillatoba Creek - Panola Quitman	0.89	1.59	2.10	1	2	1	2	4	1	2	1	3	2.00	Moderate	4	2	1.33
803020301	Burney Branch - Yocona River	0.82	1.19	1.94	2	3	3	2	4	2	2	2	3	2.63	Low	4	2	2.00
803020303	Bynum Creek - Yocona River	0.99	1.85	1.79	1	3	3	2	5	4	1	1	4	2.88	Low	5	1.5	2.00
803020401	Lee Creek - Coldwater River	0.95	1.19	2.09	1	2	2	2	5	4	1	2	3	2.63	High	5	1.5	2.33
803020504	Persimmon Creek - Skuna River	0.78	1.21	1.75	2	3	3	2	4	2	3	2	4	2.88	Low	4	2.5	2.33
803020506	Cane Creek - Yalobusha River	0.68	1.05	2.26	1	2	2	2	5	3	3	3	2	2.75	Moderate	5	2.5	3.00
803020716	Silver Creek - Big Sunflower Riv	1.16	0.94	2.01	3	1	1	1	5	5	1	3	3	2.50	High	5	1	3.00
803020718	Big Sunflower River - Little Sun	0.31	0.49	0.96	4	2	2	2	4	5	5	5	5	3.75	High	4	3.5	5.00
803020800	Collins Creek - Yazoo River	0.85	0.76	1.75	1	2	2	2	5	5	2	4	4	3.25	Low	5	2	3.67
806020301	Foster Creek - Bayou Pierre	0.61	0.93	1.80	1	4	4	3	5	4	4	3	4	3.88	Moderate	5	3.5	3.67
806020305	Willis Creek - Little Bayou Pier	0.49	0.79	1.68	1	3	3	3	5	3	4	4	4	3.63	Moderate	5	3.5	3.67

5th Level Watershed Number	5th Level Watershed Name	Riparian Road Density	Stream Crossing Density	Watershed Level Road Density	% US Forest Service	% Forested	% Ag Urban	% Rip Forest Lu	# Pt Source Sq Mi	# Dams Sq Mi	Riparian Rd Density	# Rd Crossing Density	Ws Road Density	Overall Watershed Condition	Risk levels for sediment (low, moderate, high)	Rank for Point Source Pollutants	Rank for Riparian Health	Rank for Hydrologic Modification
					rank (1-5 with 1 being the worst)											rank (1-5)		
					Watershed condition													
806020501	McCall Creek - Homochitto River	0.55	0.77	1.80	3	4	4	3	2	4	4	4	4	3.63	Low	2	3.5	4.00
806020502	Middle Fork Homochitto River - H	0.68	0.63	1.73	5	5	5	4	3	5	3	5	4	4.25	Low	3	3.5	4.33
806020503	Wells Creek - Homochitto River	0.50	0.71	1.71	3	4	4	3	4	3	4	4	4	3.75	Low	4	3.5	3.67
806020601	Upper Buffalo River	0.38	0.43	1.41	1	5	5	4	5	5	5	5	5	4.88	Low	5	4.5	5.00
806020602	Middle Buffalo River	0.49	0.69	1.52	1	5	5	4	5	5	4	4	5	4.63	Low	5	4	4.33
807020201	West Fork Amite River	0.69	0.97	1.92	1	3	3	3	5	4	3	3	3	3.38	High	5	3	3.33
807020203	Woodland Creek - Beaver Creek	0.63	0.79	1.73	1	3	3	3	5	4	3	4	4	3.63	High	5	3	3.67

Aquatic Sustainability Determinations

Species of concern were related to the four environmental factors assessed in watershed analysis (point sources, riparian habitat, flow, and sediment). Sustainability for each PET-LR was determined for each watershed where a species occurs, because in many cases watersheds support separate populations, and factors affecting sustainability can vary considerably from watershed to watershed. Sustainability determinations incorporate elements of species distribution, abundance, and sensitivities to environmental factors; watershed condition relative to the species' environmental sensitivities; and the national forest role in the watershed. Sustainability determinations are:

Outcome 1. Species occurs within the watershed with no impairment. Likelihood of maintaining sustainability is high.

Outcome 2. Species sustainability is potentially at risk in the watershed; however, the extent and location of NFS lands with respect to the species is conducive to positively influence the sustainability of the species within this watershed. Therefore, likelihood of maintaining sustainability is moderate.

Outcome 3. Species sustainability is potentially at risk within the watershed; however, the extent and location of NFS lands with respect to the species is NOT conducive to positively influence the sustainability of the species within this watershed. Likelihood of maintaining sustainability is low.

Outcome 4. The species is so rare within the watershed (population is at very low density and/or at only a few local sites) that stochastic events (accidents, weather events, etc.) may place persistence of the species within the watershed at risk. The extent and location of NFS lands with respect to the species is conducive to positively influence the sustainability of the species within this watershed. Therefore, likelihood of maintaining sustainability is moderate to low.

Outcome 5. The species is so rare within the watershed (population is at very low density and/or at only a few local sites) that stochastic events (accidents, weather events, etc.) may place persistence of the species within the watershed at risk. The extent and location of NFS lands with respect to the species is NOT conducive to positively influence the sustainability of the species within this watershed. Therefore, likelihood of maintaining sustainability is low.

E.2 Sediment Yields

In earlier planning efforts forests were directed to calculate sediment and water yield increases over time. This served as a surrogate of existing condition and provided a quantification of potential effects of forest actions. However, watershed condition was described in general physical terms, not in terms of health or vulnerability to management actions. With the current level of planning, available data layers, and GIS information there is an opportunity to specifically evaluate watershed condition and estimate the effects of management activities based on a number of watershed parameters. Sediment yield or an index of disturbance would still be used but the result would be directly related to overall watershed condition or health rather than just erosion potential. The following is a description of the process used to address Section (d) of the aquatic resources under 36 CFR, 219.23 planning rule (1982) and the associated cumulative effects for water quality and associated beneficial uses.

The purpose of this process is to estimate sediment yields and analyze the cumulative effects of proposed management actions on water quality. The process provides an objective process to systematically evaluate water quality conditions for watersheds covered in whole or part by forest plans. The process also provides results that can aid in aquatic sustainability analysis at the community scale.

The process builds upon the East-Wide Watershed Assessment Process, and provides for modifications based on local information. Interpretation of analysis results strives to describe objectives rather than "constraints" and provides the forests an opportunity to identify and focus on watersheds where there are "significant" opportunities to improve condition.

E.2.1 Cumulative Effects

"A cumulative effect is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

Sediment is an appropriate measure to determine the effects of management activities on water quality and its associated beneficial uses on forested lands (Coats and Miller, 1981). Sediment increases can adversely affect fish productivity and diversity (Alexander and Hansen, 1986), degrade drinking water and affect recreational values. There may be other cumulative impacts such as increases in water yield as a result of harvesting methods. However, water yield models do not characterize the impacts of all management activities such as road construction and the increase in water yield is generally less than the natural variability. Changes in water nutrients or nutrient fluxes within streams as a result of management activities are minor and not an appropriate consideration of cumulative effects at the forest plan level. This model uses predicted sediment yields as the surrogate for determining cumulative impacts for water quality.

Changes in land use and disturbance are modeled with respect to estimated increases in sediment and predicted impacts are summarized. The significance of predicted impacts are related to criteria designed to determine levels of watershed health (WCR) as described in a following section of this paper.

E.2.2 Bounding the Effects Analysis

A valid cumulative effects analysis must be bounded in space and time. For the purposes of forest planning, 5th level watersheds are the appropriate spatial bounds for cumulative effects. The implementation period for a forest plan is 5 to 15 years, however the appropriate time period captured for the sediment model is for 5 decades (50 years).

E.2.3 Modeling Sediment Yield

A detailed description of data sources and steps can be found in Data Sources and Manipulation. Following is a summary of the process:

- Using the National Land use Classification Data (NLCD), Digital Elevation Models (DEM), and Ecoregions data layers, a determination of combinations of land use, slope class, and physiographic zone were made for 30-meter grids. These values were tabulated for each watershed including non-Forest Service lands. Results were used to identify estimated erosion values for entire watersheds.
- Tiger Census Roads data, and Ecoregions were used to determine road surface type, physiographic zone and length. This information was used to estimate sediment values for each watershed.
- Using a combination of values from Forest Service prescriptions, slope class, and physiographic zones, these values were tabulated for each watershed
- Forest Service personnel provided values for the following categories;
    - The number of acres of prescribed fire planned by period (By ecoregion),
    - Miles of dozer fireline per acre burned,

  - Miles of temporary and permanent road constructed per acre regenerated,
  - Urban growth,
  - The rotation period on other forested lands, and
  - Other changes in land use activities or disturbances that individual forests felt were important such as oil and gas exploration, pasture conversion or strip mining.
- Coefficients for erosion were taken from the average and high erosion rates found in Dissmeyer and Stump (1978) for the appropriate physiographic zone. Recovery rates were determined from studies on the Ouachita National Forest. These recovery rates were determined through research and field observations.
- Erosion values (from land use activities) were multiplied by a sediment delivery coefficient based on watershed size determined from Roehl (1962). Sediment values from roads are part of the WEPP calculation. WEPP assumes that sediment values are delivered to the nearest channel. This model sums the total number of sediment tons from roads and calculates sediment from erosion delivered to the mouth of the watershed.
- Road (by surface type), and fireline sediment values were determined from field surveys using the WEPP model to determine sediment values. These values were converted to coefficients by physiographic zone and multiplied by the number of miles of road (by surface type), or fireline.
- All values were summarized in a spreadsheet by watershed for the baseline sediment yield and current sediment yield (Forest Service and private).
- The values from the Draft Timber Resource Program Suitability and Sustainability Analysis (USDA NF in Mississippi 2007) (total number of acres per planning period by physiographic zone, early succession class and slope class) are placed in the sediment spreadsheet for each period.
- Lastly the spreadsheet summarizes predicted management activities by watershed, and planning period.

This allows for a discussion of past, present and future activities for public and private lands by watershed for a time period of 50 years.

E.2.4 Data Interpretation

The summary worksheet of the sediment model calculates the baseline, current, and predicted sediment values for each watershed and period. To determine the potential cumulative effects of water quality and associated beneficial uses these sediment values are expressed as a percent increase over the baseline. The baseline assumes an undisturbed forest floor with no roads.

Watershed Condition Rank (WCR)

Watershed Condition Rank is a measure that characterizes the condition of 5th level watersheds with respect to current and future sediment load increases. In order to establish WCRs, the current sediment average annual yield is determined and expressed as a percent above the baseline conditions. This provides a relative measure to determine changes within watersheds. The next step in this process is determined by using fish community structure with respect to predicted sediment increases to create a fish assemblage – sediment profile. A discussion of this process is found in the Fish Assemblage – Sediment Profile section. This score is modified by a weighted average where the watershed occurs in more than one physiographic zone. Watershed condition is expressed in three categories of risk: high, medium and low. This does not necessarily translate into an excellent or poor watershed but categorizes the watersheds based on the sediment prediction/aquatic sustainability relationship.

From the WCR a series of determinations can be made that determine or assign additional Forest Objectives. The following section details the outcome of the WCR with respect to adverse effects on aquatic biota as they are related to forest management:

> Where a watershed risk level is low, the probability (or potential) is low for adverse effects to aquatic species. If the results of forest actions remain within this range there should be no adverse effect on water quality with respect to beneficial uses (fish communities). Forest Service objectives would be to maintain or improve aquatic health through the implementation of standards.
>
> Where a watershed risk level is moderate, the potential to adversely affect beneficial uses is moderate. Additional forest objectives would be considered. Examples of these additional objectives would be conducting watershed assessments during project planning to identify the source of the problem, and monitoring prior to project implementation to establish actual health of the biota.
>
> Where a watershed risk level is high, the potential to adversely affect beneficial uses is high. In addition to objectives listed above, Forest objectives at the project level would seek to maintain or restore watershed health and aquatic systems. An example would be to design project level activities to have no net increase in sediment yields.

The results of the WCR and other information can also be used to develop partnerships with other landholders or managers to improve overall watershed condition and improve aquatic health. This is one advantage of analyzing entire watersheds. Not only can Forest Service activities and contributing effects be isolated but other watershed effects can be identified as well.

Assumptions, uncertainties and limitations

Many assumptions are made throughout the sediment model and the WCR. Every effort has been made to describe those assumptions and minimize misrepresentation. With that in mind the application of the sediment model and associated WCR should not be taken as absolutes but as a method that can describe the effects from the range of actions and suggest where a greater risk with respect to water quality and aquatic biota exists. This process is developed for the forest plan level.

E.2.5 Data Sources and Manipulation

Data calculations and summary were derived from numerous sources. The following discussion identifies ArcView data layers, the source of those data layers and how they were manipulated or queried. The first step in any data manipulation is to place the data in a common projection. The projection chosen was State Plane Eastern Mississippi, NAD 27, feet.

Layers requested from the Forests include:

> **Watersheds**: Data were place in a common projection. Shared watersheds were assigned a common number when there were number conflicts.
>
> **Sustainability**: The prescriptions from each suitable area were converted to a 30-meter grid. Non-forest Service ownerships were deleted.

From the Tiger Census (2000):

Roads: Based on the CFCC data attribute road segments were assigned a road surface value of paved highway, paved local, gravel or native. These data were then intersected by watershed and ecoregion. Miles were calculated and summed by watershed, and ecoregion.

Land use and land cover factors were from:

NLCD (EPA): This information is in a 30-meter grid. The data were reclassified using the following classification.

Table E 4. Land Use and land cover data classification

Value	MRLC classification	Reclass	Mix
11	Open Water	1	Water
13	Perennial Ice/Snow	1	Water
21	Low Intensity Residential	2	Residential
22	High Intensity Residential	2	Residential
23	Commercial/Industrial/Transportation	2	Residential
31	Bare Rock/Sand/Clay	3	Quarry
32	Quarries/Strip Mines/Gravel Pits	3	Quarry
33	Transitional	4	Forest
41	Deciduous Forest	4	Forest
42	Evergreen Forest	4	Forest
43	Mixed Forest	4	Forest
51	Shrubland	5	Pasture
61	Orchards/Vineyards/Other	6	Cultivated
71	Grasslands/Herbaceous	5	Pasture
81	Pasture/Hay	5	Pasture
82	Row Crops	6	Cultivated
83	Small Grains	6	Cultivated
84	Fallow	6	Cultivated
86	Urban/Recreational Grasses	5	Pasture
91	Woody Wetlands	4	Forest
92	Emergent Herbaceous Wetlands	9	Wetlands

Digital Elevation Models provided:

Slope: Using Spatial Analysis Model Builder, discrete slope classes were identified based on percent slope. These values were then reclassified for individual forest assumptions. Slopes less than 20 percent were assigned a value of 0 and slopes greater than 20 percent were assigned a value of 1000.

From the EPA Basins data:

Ecoregions (Bailey): Physiographic zones were assigned a value of 100 – 400 (in increments of 100) and converted to a grid (30 meters).

Table E 5. Physiographic zone data values

Ecoregion	Value
Middle Coastal Plains	100
Lower Coastal Plains	200
Florida Coastal Lowlands	300
Mississippi Alluvial Basin	400

From these data sets the following queries were made for the sediment model:

Rd Inputs (Roads): – this is the sum the miles of roads (by surface type) for each watershed and ecoregion.

Lu Inputs (Land use): – this is the total number of grids summarized by ecoregion/land use/slope for each watershed.

Lu PVT Inputs (Private Land use): – this is the total number of grids from nonforest service lands (private) summarized by ecoregion/slope/slope for each watershed.

Tx Alt (A): – this is the combination of ecoregion/management prescription/slope for each watershed. This number is duplicated by the number of silviculture treatment options (usually 4). In addition treatments not found in the spectrum model are included such as prescribed fire and site preparation on national forest lands and silviculture and urban growth on private lands.

These data queries were placed in the sediment model.

E.2.6 Sediment Coefficients for Roads

The WEPP model for roads was used to develop the coefficients. This model was developed by the Rocky Mountain Research Station and San Dimas Technology and Development Center. Documentation of the WEPP:Road model is on the internet website http://forest.moscowfsl.wsu.edu/fswepp/.

Process

Forests or Ranger Districts identified roads that were representative of the roads on their respective units. Roads selected contained at least one stream crossing. All roads identified were graveled.

When possible an on-site survey was conducted to determine inputs for the WEPP:Road model. Road were divided into segments based on water diversions. Functioning waterbars, broadbased dips, wing ditches, and culverts were considered to be water diversions. If no water diversion was present and the water had created its own diversion, this also marked a segment break. Additionally, a crest in the road, where water ran off in two different directions, was considered a segment break.

Distances for road segment lengths, road widths, road fillslope lengths, and buffer lengths were paced off or visually estimated for each road segment. Road gradients, fillslope gradients, and buffer gradients were measured with a clinometer for each road segment to determine an average slope gradient. In areas where roads or trails occurred in the buffer below the road segment being inventoried, the buffer length and slope were calculated as if the road or trail in the buffer did not exist.

Measurements were then input into the WEPP:Road model on the interactive internet site http://forest.moscowfsl.wsu.edu/fswepp/. Thirty years of simulation were used. This was based on the WEPP documentation that states "[f]or climates with more than 500 mm of precipitation, 30 years of simulation is generally adequate to obtain an estimate of erosion" (Elliot et. al, 1999). The WEPP:Road model was calculated for each ecoregion. Most ecoregions were divided into two or more subdivisions. The subdivisions were determined by the geographical range of each ecoregion and National Forest.

For each ecoregion or ecoregion subdivision a sediment yield per mile of road was determined. Adding the amount of sediment from each road segment and then dividing by the total length of the road segments calculated this yield. This sediment yield, described in tons per mile, was used as the sediment coefficient in the cumulative effects model.

Sediment yields were determined separately for native surfaced, graveled, and paved roads. The same data was used to determine sediment yields for each road surface.

The same procedure used for roads was repeated with firelines and ATV trails. Only the native road surface was calculated for firelines and ATV trails.

The sediment coefficients for each ecoregion or ecoregion subdivision are shown in the attached data summary.

Assumptions, uncertainties, and limitations

Some assumptions were made due to limitations of the WEPP:Road model. These assumptions are as follows:

Any road/trail/fireline gradient over 40 percent would yield the same results as a 40 percent gradient. WEPP:Road does not accept road gradients over 40 percent.

Any road/trail/fireline gradient of less than one percent would yield the same results as a 0.3 percent gradient. WEPP:Road does not accept road gradients of less than 0.3 percent.

The absence of fillslopes would yield the same results as fillslopes with a 0.3 percent gradient and a one-foot length. WEPP:Road does not accept fillslope measurements with less than a 0.3 percent gradient and one foot length.

Any buffer length greater than 1000 feet was estimated with a regression.

WEPP:Road does not accept road segment lengths greater than 1000 feet. Any distances above 1000 feet were estimated with a regression.

Table E 6. Road sediment coefficients

Ecoregion	Data Source	Sediment Coefficients				
		Native Road	Gravel Road	Paved Road	ATV Trail	Fireline
		tons of sediment per year per mile				
Middle Coastal Plains	Clingenpeel/Lee studies	5.6	23.5	26.5	10.0	10.0
Lower Coastal Plains	Clingenpeel/Curtis studies	5.5	7.0	5.7	7.1	7.1
Florida Coastal Lowlands		15.2	7.06	5.0	2.8	2.8
Mississippi Alluvial Basin	Texas studies	15.2	5.0	5.0	2.8	2.8

E.3 Fish Assemblage – Sediment Profile

We examined the relationship between stream fish assemblage and the cumulative sediment load modeled from watershed land cover. Our objective was to determine the functional form of the relationship and developed indicators of aquatic health. These indicators of aquatic health were used for identifying and prioritizing watersheds where the Forest Service can make a positive contribution its health. Our goal was to provide conservation planning tools that can guide sustainable management of landscapes and proactively protect the integrity of aquatic resources.

Fish collections were used because of the widespread availability of data and occurrence in all watersheds and ecoregions. This data is a surrogate for other aquatic biota such as mussels, crayfishes and aquatic insects where data are not available.

E.3.1 Methods

Fish collections used in these analyses were obtained from universities and natural resource agencies. The watershed above each collection site was modeled (by physiographic province) for sediment yield using current land-use information and road network.

Middle Coastal Plains – Fish were collected from 190 sites between 1999 and 2003, by the Aquatic and Terrestrial Fauna Team, Center for Bottomland Hardwoods Research, Southern Research Station in Oxford, MS. (Melvin L. Warren, Jr., Susie Adams, Wendell Haag, J. Gordon McWhirter, and L. Gayle Henderson).

Lower Coastal Plains– Fish were collected from 167 sites between 1999 and 2003, by the Aquatic and Terrestrial Fauna Team, Center for Bottomland Hardwoods Research, Southern Research Station in Oxford, MS. (Melvin L. Warren, Jr., Susie Adams, Wendell Haag, J. Gordon McWhirter, and L. Gayle Henderson).

Florida Coastal Lowlands – Fish were collected from 3 sites between 1999 and 2003, by the Aquatic and Terrestrial Fauna Team, Center for Bottomland Hardwoods Research, Southern Research Station in Oxford, MS. (Melvin L. Warren, Jr., Susie Adams, Wendell Haag, J. Gordon McWhirter, and L. Gayle Henderson).

Mississippi Alluvial Basin - – Fish were collected from 6 sites in 1998. Data sources were the Arkansas/Robison fish database and USGS NAQWA database.

We assigned as many of the fish species from each region to several ecological groups according to Warren et al. 2001. We included endemic and tolerance assignments, trophic, habitat, and reproductive guild classifications.

Endemic fish taxa were identified from the list of fishes from each ecoregion in the planning area. Fishes were determined to be endemic if their ranges did not extend beyond three river drainages, based on information published in Warren et al. (2000).

The total number of individual fish, in each ecological classification (Appendix A), was summed for each collection. This number was divided by the total number of fish captured in the sample to estimate the relative abundance of fish representing each ecological attribute.

We examined the bivariate relationships between sediment increases for each sample watershed and relative abundance of fishes collected for that site. We then examined sediment increase for each ecological attribute for a wedge-shaped pattern (Faust et al. 1984; Terrell et al. 1996). A wedge-shaped

pattern in the data suggests that sediment may limit the ability of stream systems to support a particular ecological attribute. That is, the upper bound of the relationship decreases sharply with increasing sediment. The variation in the data below this upper bound is consistent with the concept of limiting habitat factors: while other factors (abiotic and biotic) may reduce the carrying capacity for fishes below this bound (Terrell et al. 1996), sediment increases appear to limit the maximum abundance of some species near this boundary.

The data from the wedge-shaped relationships were then broken into groups for each 500 percent increase in sediment. For each group, the values in the 99th percentile were used for the response variable. A boundary line analysis (Webb 1972) was used to regress the data to predict the maximum expected fish community response for a given increase in sediment. Using the y-intercept, relative abundance values were divided into quartiles and used to establish categories of risk. The upper quartile (the least disturbed) was considered a low risk. The next quartile was considered a moderate risk and the two bottom quartiles were considered the highest risk of an adverse biotic response to sediment increases. The low and moderate risk values for each indices for the Middle Coastal Plains and Lower Coastal Plains were averaged.

E.3.2 Results and Discussion

Wedge shaped patterns were observed for sediment increases and the following ecological attributes (Table E 7).

Table E 7. Ecoregions and ecological attributes

Guild		Ecoregion sections	
		Middle Coastal Plains	**Lower Coastal Plains**
Tolerance	Endemic[a]	Yes	Yes
	Intolerance	Yes	Yes
Trophic	Invertivore-piscivore[b]	Yes	
	BH[c]	Possible	Yes
	BI[c]	Yes	Yes
	BV[c]	Possible	
	IP[d]	Yes	Possible
	PIS[d]	Yes	Yes
	Benthic Feeder Guild[d]	Yes	Yes
	3 Trophic Food Types[d]	Yes	
	4 Trophic Food Types[d]	Yes	
Habitat	Benthic Habitat	Yes	Yes
Reproduction	CG[b]	Yes	Yes
	AT[b]	Yes	
	NA[b]	Yes	Yes
	BBC[e]	Yes	
	BCA[e]	Possible	Yes
	OBC[e]	Yes	Yes
	Veg Rep sub[d]	Yes	Yes

a - from Warren et al, 2000.
b - modified from McCormic et a,l in press.
c - modified from Halliwell et al, 1998.
d - modified from Smogor and Angermeier, 1998.
e - modified from Simon, 1998
BH= benthic herbivores; BI= benthic insectivore; BV= benthic invertivores; IP+invertivore/piscivore; PIS=piscivore or parasitic; CG=clean gravel/sand; AT=egg-attacher; NA=nest associate; BBC= Brood hiders, buriers, clean sand/gravel; BCA= Brood hiders, crevice, attachers; OBC= open, benthic, clean sand/gravel; Veg. Rep. Sub=vegetation or organic debris reproductive substrate.

Nineteen fish community indices were tested for relationships to sediment increases for the Middle Coastal Plains and Lower Coastal Plains. The Middle Coastal Plains and Lower Coastal Plains,

respectively had 16 and 12 indices that exhibited a wedge shaped relationship. Table E 8 shows the risk of aquatic species for sediment increases. The Florida Coastal Lowlands and Mississippi Alluvial Basin has insufficient sample points to determine wedge patterns. However there was sufficient range of data points in the Florida to establish quartile breaks. The risk levels for the Mississippi Alluvial Basin were taken from the Delta region in Arkansas.

Table E 8. Risk levels and sediment increase by ecoregions

Risk Level	Ecoregion			
	Middle Coastal Plain	Lower Coastal Plain	Florida Coastal Lowlands	Mississippi Alluvial Basin
	percent above baseline			
Low	0 to 2,090	0 to 1,253	0 to 7,613	0 to 4,173
Moderate	2,090 to 4,179	1,253 to 2,506	7,613 to 15,226	4,800 to 9,601
High	> 4,179	> 2,506	> 15,226	> 9,601

Table E 9. Ecological attributes of fishes collected

		Tolerance		Trophic										Habitat	Reproduction						
Species	Common name	Endemic[a]	Intolerance	Invertivore[b]	Insectivore-piscivore[b]	BH[c]	BI[c]	BV[c]	IP[d]	PIS[d]	Benthic Feeder Guild[d]	3 Trophic Food Types[d]	4 Trophic Food Types[d]	Benthic Habitat	CG[b]	AT[b]	NA[b]	BBC[e]	BCA[e]	OBC[e]	Veg. Rep. sub[d]
Ambloplites ariommus	shadow bass	N	Y	N	Y	N	N	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N
Ameiurus melas	black bullhead	N	N	N	N	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N	N	N
Ameiurus natalis	yellow bullhead	N	N	N	N	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N	N	N
Ameiurus nebulosus	brown bullhead	N	*	N	N	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N	N	N
Amia calva	bowfin	N	*	N	Y	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	Y
Ammocrypta beani	naked sand darter	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N
Ammocrypta meridiana	southern sand darter	Y	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N
Ammocrypta vivax	scaly sand darter	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N
Aphredoderus sayanus	pirate perch	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
AplodiNtus grunniens	freshwater drum	N	*	Y	N	N	N	Y	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Carpiodes cyprinus	quillback	N	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Centrarchus macropterus	flier	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Cyprinella camura	bluntface shiner	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	Y	N	N
Cyprinella lutrensis	red shiner	N	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cyprinella venusta	blacktail shiner	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	Y	N	N
Cyprinus carpio	common carp	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N
Dorosoma cepedianum	gizzard shad	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

		Tolerance		Trophic										Habitat	Reproduction						
Species	Common name	Endemic[a]	Intolerance	Invertivore[b]	Insectivore-piscivore[b]	BH[c]	BI[c]	BV[c]	IP[d]	PIS[d]	Benthic Feeder Guild[d]	3 Trophic Food Types[d]	4 Trophic Food Types[d]	Benthic Habitat	CG[b]	AT[b]	NA[b]	BBC[e]	BCA[e]	OBC[e]	Veg. Rep. sub[d]
Dorosoma petenense	Threadfin shad	N	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Elassoma zonatum	banded pygmy sunfish	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y
Ericymba buccata	silverjaw minnow	N	N	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Erimyzon oblongus	creek chubsucker	N	*	Y	N	N	N	N	N	N	Y	Y	N	Y	N	N	N	N	N	Y	N
Erimyzon succetta	lake chubsucker	N	*	Y	N	N	N	N	N	N	Y	Y	N	Y	N	N	N	N	N	N	N
Erimyzon tenuis	sharpfin chubsucker	N	*	Y	N	N	N	N	N	N	Y	Y	N	Y	N	N	N	N	N	N	N
Esox americanus	grass pickerel	N	*	N	Y	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	Y
Esox niger	Chain pickerel	N	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Etheostoma artesiae	redspot darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	Y	N	N	N
Etheostoma caeruleum	rainbow darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N
Etheostoma chlorosomum	bluntnose darter	N	N	Y	N	N	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N
Etheostoma fusiforme	swamp darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N
Etheostoma gracile	slough darter	N	N	Y	N	N	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N
Etheostoma histrio	harlequin darter	N	N	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Etheostoma lachneri	Tombigbee Darter	Y	*	Y	N	N	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N
Etheostoma lynceum	brighteye darter	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N

		Tolerance		Trophic										Habitat	Reproduction						
Species	Common name	Endemic[a]	Intolerance	Invertivore[b]	Insectivore-piscivore[b]	BH[c]	BI[c]	BV[c]	IP[d]	PIS[d]	Benthic Feeder Guild[d]	3 Trophic Food Types[d]	4 Trophic Food Types[d]	Benthic Habitat	CG[b]	AT[b]	NA[b]	BBC[e]	BCA[e]	OBC[e]	Veg. Rep. sub[d]
Etheostoma nigrum	johnny darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Etheostoma parvipinne	goldstripe darter	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N
Etheostoma proeliare	cypress darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N
Etheostoma raneyi	Yazoo darter	Y	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N
Etheostoma rupestre	rock darter	Y	N	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	Y	N
Etheostoma stigmaeum	speckled darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N
Etheostoma swaini	gulf darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N
Etheostoma zonistium	bandfin darter	Y	*	Y	N	N	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N
Fundulus catenatus	Northern studfish	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N
Fundulus cf. sp. euryzonus	undescribed topminnow	Y	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fundulus chrysotus	golden topminnow	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N
Fundulus Ntatus	blackstripe topminnow	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N
Fundulus Ntti	southern starhead topminnow	N	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fundulus olivaceus	blackspotted topminnow	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N
Gambusia affinis	mosquitofish	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Hybognathus hayi	cypress minnow	N	*	N	N	Y	N	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N

		Tolerance		Trophic										Habitat	Reproduction						
Species	Common name	Endemic[a]	Intolerance	Invertivore[b]	Insectivore-piscivore[b]	BH[c]	BI[c]	BV[c]	IP[d]	PIS[d]	Benthic Feeder Guild[d]	3 Trophic Food Types[d]	4 Trophic Food Types[d]	Benthic Habitat	CG[b]	AT[b]	NA[b]	BBC[e]	BCA[e]	OBC[e]	Veg. Rep. sub[d]
Hybognathus nuchalis	Mississippi silvery minnow	N	*	N	N	Y	N	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N
Hybopsis winchelli	clear chub	N	Y	Y	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	Y	N
Hypentelium etowanum	Alabama hog sucker	N	Y	Y	N	N	N	N	N	N	Y	Y	N	Y	Y	N	N	N	N	Y	N
Hypentelium nigricans	Northern hog sucker	N	Y	Y	N	N	N	N	N	N	Y	Y	N	Y	Y	N	N	N	N	Y	N
Ictalurus punctatus	channel catfish	N	N	N	N	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	N	N	N
lamprey	unidentified lamprey	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Labidesthes sicculus	brook silverside	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Lepisosteus oculatus	spotted gar	N	*	N	Y	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	Y
Lepisosteus osseus	longnose gar	N	*	N	Y	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
Lepomis cyanellus	green sunfish	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
Lepomis cyanellusxmacrochirus	Lepomis hybrid	N	*	*	*	*	*	*	*	*	X	X	X	*	*	*	*	*	*	*	*
Lepomis gulosus	warmouth	N	*	N	Y	N	N	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N
Lepomis humilis	orangespotted sunfish	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Lepomis macrochirus	bluegill	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Lepomis marginatus	dollar sunfish	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Lepomis megalotis	longear sunfish	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Lepomis microlophus	redear sunfish	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

		Tolerance		Trophic										Habitat	Reproduction						
Species	Common name	Endemic[a]	Intolerance	Invertivore[b]	Insectivore-piscivore[b]	BH[c]	BI[c]	BV[c]	IP[d]	PIS[d]	Benthic Feeder Guild[d]	3 Trophic Food Types[d]	4 Trophic Food Types[d]	Benthic Habitat	CG[b]	AT[b]	NA[b]	BBC[e]	BCA[e]	OBC[e]	Veg. Rep. sub[d]
Lepomis miniatus	redspotted sunfish	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Lepomis sp.	Lepomis hybrid	N	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Luxilus chrysocephalus	striped shiner	N	*	Y	N	N	N	N	N	N	N	N	Y	N	N	N	Y	Y	N	N	N
Lythrurus bellus	pretty shiner	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	Y	N	N	N	N
Lythrurus fumeus	ribbon shiner	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N
Lythrurus roseipinnis	cherryfin shiner	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N
Lythrurus umbratilis	redfin shiner	N	*	Y	N	N	N	N	N	N	N	Y	N	N	N	N	Y	N	N	N	N
Micropterus punctulatus	spotted bass	N	*	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
Micropterus salmoides	largemouth bass	N	*	N	Y	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
Minytrema melaNps	spotted sucker	N	*	Y	N	N	N	N	N	N	Y	Y	N	Y	N	N	N	N	N	N	N
Moxostoma erythrurum	golden redhorse	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	N	N	Y	N
Moxostoma poecilurum	blacktail redhorse	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	N	N	Y	N
Moxostoma sp.	Redhorse genus	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	N	N	Y	N
Ncomis leptocephalus	bluehead chub	N	*	Y	N	N	N	N	N	N	N	Y	N	N	Y	N	N	Y	N	N	N
Ntemigonus crysoleucas	golden shiner	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Ntropis ammophilus	orangefin shiner	N	N	Y	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
Ntropis atheriNides	emerald shiner	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Ntropis baileyi	rough shiner	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N

		Tolerance		Trophic										Habitat	Reproduction						
Species	Common name	Endemic[a]	Intolerance	Invertivore[b]	Insectivore-piscivore[b]	BH[c]	BI[c]	BV[c]	IP[d]	PIS[d]	Benthic Feeder Guild[d]	3 Trophic Food Types[d]	4 Trophic Food Types[d]	Benthic Habitat	CG[b]	AT[b]	NA[b]	BBC[e]	BCA[e]	OBC[e]	Veg. Rep. sub[d]
Ntropis longirostris	longnose shiner	N	*	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
Ntropis maculatus	taillight shiner	N	*	N	N	Y	N	N	N	N	N	N	N	N	*	*	*	*	*	*	N
Ntropis rafinesquei	Yazoo shiner	Y	N	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Ntropis texanus	weed shiner	N	*	N	N	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N
Ntropis volucellus	mimic shiner	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N
Nturus funebris	black madtom	N	Y	Y	N	N	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
Nturus gyrinus	tadpole madtom	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Nturus hildebrandi	least madtom	Y	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Nturus leptacanthus	speckled madtom	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Nturus miurus	brindled madtom	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Nturus Ncturnus	freckled madtom	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Nturus phaeus	brown madtom	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N
Opsopoeodus emiliae	pugnose minnow	N	*	Y	N	N	N	N	N	N	N	N	N	Y	N	Y	N	N	N	N	N
Percina maculata	blackside darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N
Percina nigrofasciata	blackbanded darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N
Percina sciera	dusky darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N
Percina shumardi	river darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N

		Tolerance		Trophic										Habitat	Reproduction						
Species	Common name	Endemic[a]	Intolerance	Invertivore[b]	Insectivore-piscivore[b]	BH[c]	BI[c]	BV[c]	IP[d]	PIS[d]	Benthic Feeder Guild[d]	3 Trophic Food Types[d]	4 Trophic Food Types[d]	Benthic Habitat	CG[b]	AT[b]	NA[b]	BBC[e]	BCA[e]	OBC[e]	Veg. Rep. sub[d]
Percina vigil	saddleback darter	N	*	Y	N	N	Y	N	N	N	Y	N	N	Y	Y	N	N	Y	N	N	N
Pimephales Ntatus	bluntnose minnow	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N
Pimephales promelas	fathead minnow	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N
Pimephales vigilax	bullhead minnow	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N
Pomoxis annularis	white crappie	N	*	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
Pomoxis nigromaculatus	black crappie	N	*	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
PteroNtropis signipinnis	flagfin shiner	N	*	Y	N	N	N	N	N	N	N	N	N	N	*	*	*	*	*	*	N
PteroNtropis welaka	bluenose shiner	N	*	Y	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	Y	N
Pylodictis olivaris	flathead catfish	N	*	N	Y	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N
Semotilus atromaculatus	creek chub	N	N	Y	N	N	N	N	Y	N	N	N	Y	N	Y	N	N	Y	N	N	N

a - from Warren et al, 2000.

b - modified from McCormic et a,l in press.

c - modified from Halliwell et al, 1998.

d - modified from Smogor and Angermeier, 1998.

e - modified from Simon, 1998

BH= benthic herbivores; BI= benthic insectivore; BV= benthic invertivores; IP+invertivore/piscivore; PIS=piscivore or parasitic; CG=clean gravel/sand; AT=egg-attacher; NA=nest associate; BBC= Brood hiders, buriers, clean sand/gravel; BCA= Brood hiders, crevice, attachers; OBC= open, benthic, clean sand/gravel; Veg. Rep. Sub=vegetation or organic debris reproductive substrate.

* = unknown

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Appendix F -
Management Indicator Species

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Appendix F - Management Indicator Species

Document Abstract

This report documents the review of the original 1985 management indicator species list. Identifies species determined to be indicators of management effects concerning plan implementation on plant and animal diversity for the revised plan.

F.1 Introduction

During development of the 1985 Land and Resource Management Plan (forest plan) for National Forests in Mississippi, 44 management indicator species were selected. This report documents the evaluation of these species to determine if these species and others are valid indicators of management effects concerning plan implementation on plant and animal diversity.

Both the concept of management indicator species and the application of the management indicator species concept have been critically reviewed in the scientific literature since the 1982 regulations were adopted. Limits to the usefulness of the concept and/or its application are reflected in the literature (e.g., Caro and O'Doherty 1999; Grossman et al. 1990; Landres, Verner, and Thomas 1988; Noss 1990; Simberloff 1998; Weaver 1995). Nonetheless, the 1982 regulations will remain in effect until further direction.

F.1.1 Review of 1985 Management Indicator Species

The process and rationale for selection of management indicator species for the 1985 forest plan is summarized below:

Selection was made from a complete listing of known vertebrates occurring on the National Forests in Mississippi. Basically, the process of elimination was used to screen species down to optimal candidates and select on particular characteristics that meet management needs. Process procedure is as follows:

1. Elimination of those species not dependent on forested habitat or not affected by management activities. This included species, which were found in various habitat types and considered to be habitat generalists.
2. Elimination of transient species and non-residents, which were not significantly dependent on national forest lands.
3. Eliminated species, which could not be suitably evaluated due to the lack of information or the need of a usable monitoring procedure.
4. The resulting list was then examined to identify species with the most limiting requirements on forest seral stages and special habitat components.
5. Major habitat components were examined to determine adequate species representation.
6. High demand species were added to represent public interest and address issues and concerns.
7. Review by cooperating agencies and professionals in the field of wildlife research and management.

Table F 1. Management indicator species selected for National Forests in Mississippi in the 1985 Forest Plan

Demand Species	Viability Concern	Ecological Indicators
Terrestrial Habitats		
White-Tailed Deer	Red Cockaded Woodpecker	Pileated Woodpecker
Wild Turkey	Gopher Tortoise	Eastern Meadowlark
Fox Squirrel	Pitcher Plants	Pine Warbler
Eastern Gray Squirrel		Downy Woodpecker
Delta Fox Squirrel		American Kestrel
Northern Bobwhite Quail		Screech Owl
Wood Duck		Rufous-Sided Towhee
		Hooded Warbler
		Wood Duck
		Bachman's Sparrow
Aquatic Habitats (Lakes and Ponds)		
Largemouth Bass		Golden Shiner
Bluegill		Lake Chubsucker
Redear Sunfish		
Black Crappie		
White Crappie		
Channel Catfish		
Aquatic Habitats (Northern Streams-streams north of Interstate 20)		
Largemouth Bass		Southern Brook Lamprey
Bluegill		Bluntface Shiner
Longear Sunfish		Striped Shiner
		Freckled Madtom
		Blackbanded Darter
		Banded Darter
Aquatic Habitats (Southwestern Streams-south of I-20 and west of Hwy. 49)		
Spotted Bass		Banded Darter
		Southern Brook Lamprey
		Rainbow Darter
		Brindled Madtom
		Longnose Shiner
		Bluntface Shiner
		Blacktail Redhorse
Aquatic Habitats (Southeastern Streams- south of I-20 and east of Hwy.49)		
Spotted Bass		Gulf Darter
Longear Sunfish		Blackbanded Darter
Shadow Bass		Cherryfin Shiner
		Weed Shiner
		Speckled Madtom

This process resulted in selection of 44 species as management indicator species in 1985 (Table F 1). The 44 species designated as management indicator species in the 1985 forest plan were evaluated to determine whether or not these species were meeting the purposes for which they were selected and to consider other species that may need to be added. Each species was considered in turn to determine whether or not the management indicator species was dependent on forested habitat and was affected by management activities. Species that were found in various habitats (habitat generalists) were likewise selected against. Some species were removed because of the lack of a usable and efficient monitoring system. Not all forest types or management activities were represented, only those for which there was the most perceived management activity. Game species previously selected, although of high public value, were considered to be habitat generalists and not good indicators of management and thus were removed as management indicator species. These species will continue to be monitored as game species by the Mississippi Department of Wildlife, Fisheries and Parks. Following the aforementioned considerations, four previously selected species and four newly selected species were carried forward for additional evaluation concerning management emphasis, management influence, and effects of management on habitat niche (see section F.1.4). This process resulted in the selection of six species to represent indicators of management on the National Forests in Mississippi.

Red-cockaded Woodpecker (*Picoides borealis*)

Habitat Association - 40+ years, longleaf/yellow pine

Habitat Monitoring – FSVeg database, acres prescribed burned, acres of mid-story control

Population Monitoring - Number of active clusters

This species was selected to represent mature longleaf/yellow pine forest. The red-cockaded woodpecker is listed as federally endangered throughout its range and is dependent on national forest management for its recovery and survival. Many management practices on the National Forests in Mississippi are focused on improvement of red-cockaded woodpecker habitat (ex. prescribed burning, mid-story removal, forest thinning, etc.). There is a direct correlation between management activities and red-cockaded woodpecker population levels. This species is fairly easy to monitor, and the forest has numerous years of population trend data previously collected.

Recommendation: Evaluate further. Continue to monitor under current protocols.

Gopher Tortoise (*Gopherus polyphemus*)

Habitat Association - 40+ years, longleaf/slash pine

Habitat Monitoring – FSVeg database, priority soil surveys

Population Monitoring – Burrow surveys

This species was selected to represent mature longleaf/slash pine forests. However, it also influenced by soil types and understory conditions. Population declines have occurred as a result of habitat destruction, habitat degradation, and human predation. Gopher tortoises are a “K” species (long lived, low reproductive rate); therefore, response to management takes a long time which suggests that the species would not be a good indicator of current management.

Recommendation: Remove from management indicator species list. Continue to monitor under current protocols.

Pitcher Plants (*Sarracenia* spp.)

Habitat Association – Coastal bogs and savannahs

Habitat Monitoring – FSVeg database (acres of pitcher plant bogs)

This species was selected to represent unique lower coastal plain habitat called coastal bogs and savannahs. Maintaining coastal bogs and savannahs continue to be a management focus for the National Forests in Mississippi. Although this genus is an important attribute of these ecosystems, monitoring is not efficient nor a true reflection of management of these systems. Management of these systems will be monitored by acres restored as the plan is implemented.

Recommendation: Remove from management indicator species list. Continue to monitor under current protocols.

White-tailed Deer (*Odocoileus virginianus*)

Habitat Association - 0-10 years, all forest types

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

This species was selected to represent early forest habitat. However, this species is actually a habitat generalist and does well in areas containing a mix of habitat types. There is no direct correlation between Forest Service management activities and deer population levels.

Recommendation: Remove from management indicator species list. However, because the white-tailed deer is a demand species, monitoring of harvest data should continue.

Eastern Wild Turkey (*Meleagris gallopavo*)

Habitat Association – 40+ years, all forest types

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

This species was selected to represent mature forests. However, turkey populations are also influenced by early seral habitat, prescribed fire, and the development of low vegetation under forest cover. Harvest data from wildlife management areas may be influenced by other factors and therefore may not be a good indicator of Forest Service management.

Recommendation: Remove from management indicator species list. However, because the Eastern wild turkey is a demand species, monitoring of harvest data should continue.

Eastern Gray Squirrel (*Sciurus carolinensis*)

Habitat Association – 40+ years, all pine-hardwood and hardwood

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

This species was selected to represent mature pine-hardwood and hardwood forest. Harvest data from wildlife management areas may be influenced by other factors (ex. hunter effort) and therefore may not

be a good indicator of Forest Service management. In addition, squirrel populations are highly variable because of their responsiveness to abundance of annual mast crops, which can vary widely from year to year. Lastly, wildlife management area harvest data does not differentiate between gray squirrels and fox squirrels. Eastern gray squirrel harvest is based on estimated percentage of total squirrel harvest by wildlife management area biologists/managers.

Recommendation: Remove from management indicator species list. However, because the Eastern gray squirrel is a demand species, monitoring of harvest data should continue.

Fox squirrel (*Sciurus niger*)

Habitat Association – 40+ years, longleaf pine

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

(40+ years, longleaf pine) (wildlife management area harvest data) – This species was selected to represent mature longleaf pine forest. However, current literature suggests that fox squirrels are associated with edge habitats. The National Forests in Mississippi does not have a goal of managing for edge habitat. Harvest data from wildlife management areas may be influenced by other factors (ex. hunter effort) and therefore may not be a good indicator of Forest Service management. In addition, squirrel populations are highly variable because of their responsiveness to abundance of annual mast crops, which can vary widely from year to year. Lastly, wildlife management area harvest data does not differentiate between gray squirrels and fox squirrels. Fox squirrel harvest is based on estimated percentage of total squirrel harvest by wildlife management area biologists/managers.

Recommendation: Remove from management indicator species list. However, because the fox squirrel is a demand species, monitoring of harvest data should continue.

Delta Fox Squirrel (*Sciurus niger subauratus*)

Habitat Association – 40+ years, hardwood forests

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

This species was selected to represent mature bottomland hardwood forests on the Delta National Forest. Harvest data from wildlife management areas may be influenced by other factors (ex. hunter effort) and therefore may not be a good indicator of Forest Service management. In addition, squirrel populations are highly variable because of their responsiveness to abundance of annual mast crops, which can vary widely from year to year. Lastly, wildlife management area harvest data does not differentiate between gray squirrels and fox squirrels. Delta fox squirrel harvest is based on estimated percentage of total squirrel harvest by wildlife management area biologists/managers.

Recommendation: Remove from management indicator species list. However, because the Delta fox squirrel is a demand species, monitoring of harvest data should continue.

Northern Bobwhite (*Colinus virginianus*)

Habitat Association - 0-10 years, longleaf/yellow pine

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data, breeding bird survey data

This species was selected to represent early age longleaf/yellow pine forests. However, this species actually represents conditions of interspersed woodland, with open grassy conditions. Trend data indicate that populations are declining across most of its range. Many of the causes for decline can be attributed to factors beyond the scope of Forest Service management (ex. predators, invasive pests, etc.)

Recommendation: Remove from management indicator species list. However, because northern bobwhite quail is a demand species, monitoring of harvest data should continue.

Wood Duck (*Aix sponsa*)

Habitat Association – Delta wetlands and sloughs

Population Monitoring – Wildlife management area harvest data, nest box use, breeding bird survey data

This species was selected to represent wetland and slough habitat on the Delta National Forest. Maintaining wetland and slough habitat on the Delta National Forest continues to be a management focus on the National Forests in Mississippi. While nest box monitoring indicates that wood ducks are reproducing at acceptable rates on the Delta National Forest, other data sources such as hunter harvest statistics and bird point counts are not well suited to monitoring wood duck populations. Hunter harvest statistics are not well suited because wood ducks are not reported separately from other duck species harvested. Point counts, by their nature are not suited to sampling a species such as wood duck that exhibit relatively low densities and very clumped distributions. This species was initially carried forward to be evaluated further pertaining to importance of management emphasis, management influence, and uniqueness of habitat niche. This process concluded that the wood duck ranked low in all evaluation criteria and does not efficiently indicate the effects of management activities.

Recommendation: Evaluate further. Continue to monitor through nest box use.

Bachman's Sparrow (*Aimophila aestivalis*)

Habitat Association - 0-10 years, longleaf/slash pine

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

This species represents open mature pine forest with fire maintained conditions rather than 0-10 longleaf/slash as it was associated to in the past. After discussion, it was decided that red-cockaded woodpecker was a better representative of management activities associated with mature pine forest due to more in depth data collection.

Recommendation: Remove from management indicator species list. Continue to monitor through breeding bird survey (point counts).

Eastern meadowlark (*Sturnella magna*)

Habitat Association - 0-10 years, yellow pine

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species is not a forest bird. It is associated with open habitats like prairies, hayfields and pastures and is in decline across its range. The lack of detection of eastern meadowlark, despite considerable monitoring effort indicates this species is not an adequate indicator of early yellow pine habitat nor would it be for open ecosystem types due to its decline rangewide.

Recommendation: Remove from management indicator species list.

American Kestrel (*Falco sparverius*)

Habitat Association - 0-10 years, pine-hardwood

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent early age mixed pine-hardwood forests and snag/cavity habitat. Data on populations of American kestrel on the National Forests in Mississippi for bird counts are sparse, despite considerable effort expended on point counts. Other species easily found during point counts could represent snag/cavity habitat.

Recommendation: Remove from management indicator species list.

Rufous-sided Towhee (*Pipilo erythrophthalmus*)

Habitat Association - 0-10 years, hardwood

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent early age hardwood forests. However, current literature indicates that rufous-sided towhees are associated with edge habitats. The National Forests in Mississippi do not have a goal of managing for edge habitat.

Recommendation: Remove from management indicator species list. Continue to monitor through breeding bird surveys (point counts).

Pileated Woodpecker (*Dryocopus pileatus*)

Habitat Association – 40+ years, all forest types

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent mature forests. It is also an indicator of snag/cavity habitat. The pileated woodpecker is easy to monitor through current breeding bird survey.

Recommendation: Evaluate further. Continue to monitor through breeding bird surveys (point counts).

Pine Warbler (*Dendroica pinus*)

Habitat Association – 40+ years, yellow pine

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent mature yellow pine forest. However, this species is actually associated with numerous seral stages of all pine forest. Presently, another species (red-cockaded woodpecker) is recommended to indicate the management of pine forest.

Recommendation: Remove from management indicator species list. Continue to monitor through breeding bird surveys (point counts).

Downy woodpecker (*Picoides pubescens*)

Habitat Association – 40+ years, slash pine

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent mature slash pine forest and snag/cavity habitat. However, current literature suggests that downy woodpeckers are associated with middle-aged and mature forest of both pine and hardwoods. Since the great majority of slash pine forests are introduced off-site plantations targeted to be restored to longleaf pine, these habitats are expected to decline. No species is known to depend exclusively on these slash pine forests, and current management actions are designed to return these acres to longleaf pine. In addition, another species (pileated woodpecker) is recommended to indicate the management of snag/cavity habitat.

Recommendation: Remove from management indicator species list. Continue to monitor through breeding bird surveys (point counts).

Eastern Screech-Owl (*Otus asio*)

Habitat Association – 40+ years, pine-hardwood

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent mature pine-hardwood forest. However, it is also associated with open to medium growth pine as well as clearings and forest edges. In addition, this species is nocturnal. Data on populations of eastern screech-owl on the National Forests in Mississippi are sparse, despite considerable effort expended on point counts. Because regional data indicates an increasing trend, this suggests that eastern screech-owl populations on the National Forests in Mississippi are not being adequately sampled by the breeding bird point counts.

Recommendation: Remove from management indicator species list.

Hooded Warbler (*Wilsonia citrina*)

Habitat Association – 40+ years, hardwood forests

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent mature hardwood forest. The National Forests in Mississippi continue to maintain mature hardwood forests in the forest plan. The hooded warbler is easy to monitor

through current breeding bird survey. This species was initially carried forward to be evaluated further pertaining to importance of management emphasis, management influence, and uniqueness of habitat niche. This process concluded that the hooded warbler ranked low in all evaluation criteria and does not efficiently indicate the effects of management activities on the National Forests in Mississippi.

Recommendation: Evaluate further. Continue to monitor through breeding bird surveys (point counts).

Lotic Fish

Species

Southern brook lamprey (*Ichthyomyozon gagei*), cherryfin shiner (*Lythururus roseipinnis*), bluntface shiner (*Cyprinella camura*), striped shiner (*Luxilus chrysocephalus*), longnose shiner (*Notropis longirostris*), weed shiner (*Notropis texanus*), blacktail redhorse (*Moxostoma poecilurum*), freckled madtom (*Noturus nocturnus*), brindled madtom (*Noturus miurus*), speckled madtom (*Noturus leptacanthus*), bluegill (*Lepomis macrochirus*), longear sunfish (*Lepomis megalotis*), largemouth bass (*Micropterus salmoides*), spotted bass (*Micropterus punctulatus*), shadow bass (*Ambloplites ariommus*), blackbanded darter (*Percina nigrofasciata*), brighteye darter (*Etheostoma lynceum*), rainbow darter (*Etheostoma caeruleum*), and Gulf darter (*Etheostoma swaini*)

Habitat Association-

Northern streams - streams north of Interstate 20

Southwestern streams - streams south of Interstate 20 and west of Highway 49

Southeastern streams - streams south of Interstate 20 and east of Highway 49

Population Monitoring – Stream electrofishing and seining data

None of the nineteen fish species selected in 1985 serve their intended purpose as management indicator species. The following discussion is a summary of the reasons that individual fish species make poor choices as management indicator species. This in no way diminishes the biological importance of these organisms or suggests that monitoring of fish species should be reduced on the National Forests in Mississippi. Fish populations simply do not lend themselves to the analysis of cause and effect relationships with land management activities for the following reasons.

8. Interspersed land ownership—Most of the 24 watersheds on the National Forests in Mississippi have a relatively low percentage of National Forest System land. In fact, the National Forests in Mississippi exhibit a highly unconsolidated land ownership pattern. Seventeen of 24 watersheds have approximately 5 percent or less National Forest System lands. Thus, fish populations in a given watershed are likely to be significantly influenced by factors occurring on private land, which are both out of National Forests in Mississippi control and largely unknown to Forest Service personnel.
9. Fish are highly mobile—Fish can and do move away from stream events which alter their environment. These events may be natural, such as flood or drought conditions, or human related alterations such as channel modifications or changes in land management practices. In either event sampling methods designed to establish long-term population trends can be greatly affected by short-term movements of an indicator species (fish).
10. Some fish species, such as the brindled madtom actively avoid detection or capture. Madtoms will bury themselves up to several inches in the stream substrate to avoid capture. Thus, detection becomes extremely difficult even when the species is present in the sampling area.

Recommendation: Remove all 19 species from management indicator species list. However, monitoring of streams should continue. Monitoring in the future should focus on a fish community-based assessment. Fish species should be grouped together based on their feeding and/or reproductive strategies. Indices or percentages would be generated based on these strategies. While populations of individual species are variable and may fluctuate from year to year in a particular stream or watershed, the community-based approach should provide more consistent information. Any significant changes in community-based metrics may warrant additional investigation into the health of a stream or watershed.

Lentic Fish

Species

Largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), channel catfish (*Ictalurus puncitatus*), golden shiner (*Notemingonus chrysoleucas*), lake chubsucker (*Erimyzon sucetta*)

Habitat Association – Lakes and ponds

Population Monitoring – Electrofishing and seining

These species were selected to represent lentic (lake) habitat. Monitoring is conducted by electrofishing and seining. Many management practices such as liming, fertilizing, and spawning habitat improvement are focused on providing recreational fishing opportunities on the National Forests in Mississippi. Largemouth bass is the principal predator in most National Forests in Mississippi lakes and is also a demand species. Population structure of this species has been a good indicator the effectiveness of Forest Service management activities. Because of their low level of occurrence and difficulty in capturing, redear sunfish, black crappie, white crappie, channel catfish, golden shiner, and lake chubsucker have not been good indicators of management effectiveness.

Recommendation: Evaluate largemouth bass further. Remove other 7 species as management indicator species. Continue to monitor those species using current electrofishing protocol.

F.1.2 Additional Species Evaluated

Longleaf Pine (*Pinus palustris*)

Species Association – Red-cockaded woodpecker, gopher tortoise, Mississippi gopher frog

Habitat Monitoring – FSVeg database

Species was selected to measure the effectiveness of management to restore longleaf pine ecosystem. Measure of effectiveness is by acres of longleaf pine planted by year and number of acres of longleaf pine classified in FSVEG.

Southern Pine Beetle (*Dendroctonus fontalis*)

Habitat Association – Overstocked pine forests

Habitat Monitoring – FSVeg database

Population Monitoring – Southern Research, Pineville

This species is selected to measure the effects of forest management aimed at promoting forest health (e.g., site/soil based species selection, appropriate fire cycles, and preventing or thinning of overstocked stands). However, we don't fully understand what triggers southern pine beetle outbreak population cycles, during which southern pine beetle is much less discriminatory in its tree killing behavior, and will impact less susceptible stands/species on a much more frequent basis, although to a lesser degree, i.e. everything is vulnerable to being attacked during outbreaks, but spots in less susceptible stands will typically exhibit lower damage, losses, spread, and duration, than those in more susceptible or higher hazard conditions. Aggressive 1st thinnings, snag retention, sawtimber thinning, as well as frequent burning of more burnable acres and longleaf restoration on appropriate sites, will reduce the adverse impacts of southern pine beetle when outbreak conditions materialize in the future.

Monitoring will be conducted using southern pine beetle phermone trapping survey.

Wood Thrush (*Hylocichla mustelina*)

Habitat Association – Mature forest interior

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species is known to require large tracts of unbroken forest interior for successful breeding to occur. This will measure the ability of the Forest Service to reduce “edge” in its vegetation management program. Monitoring will be by breeding bird survey and FSVEG database in conjunction with GIS analysis of mature forest stands as compared to open areas.

F.1.3 Management Indicator Species Selected

Five previously selected species and three newly selected species were carried forward for additional evaluation concerning management emphasis, management influence, and effects of management on habitat niche (section F.1.4). Each species was assigned a score of 1-3 in order of priority with 3 being the most important for each category. A composite ranking average was calculated for each species and any proposed management indicator species having an average composite ranking average of 5 or greater were selected. This process resulted in the selection of six species to represent indicators of management on the National Forests in Mississippi. In order to estimate the effects of management activities on fish and wildlife populations the following species have been selected because their population changes are believed to indicate the effects of management activities.

Largemouth Bass (*Micropterus salmoides*)

Many management practices such as liming, fertilizing, and spawning habitat improvement are focused on providing recreational fishing opportunities on the National Forests in Mississippi. Largemouth bass is the principal predator in most National Forests in Mississippi lakes and is also a demand species. Population structure of this species has been a good indicator of the effectiveness of Forest Service management activities.

Longleaf Pine (*Pinus palustris*)

This species was selected to measure the effectiveness of management to restore the longleaf pine ecosystem. Measure of effectiveness is by acres of longleaf pine planted by year and number of acres of longleaf pine classified in Forest Service vegetation management database (FSVEG).

Red-cockaded Woodpecker (*Picoides borealis*)

This species was selected to represent mature longleaf/yellow pine forest. The red-cockaded woodpecker is listed as federally endangered throughout its range and is dependent on national forest management for its recovery and survival. Many management practices on the National Forests in Mississippi are focused on improvement of red-cockaded woodpecker habitat (ex. prescribed burning, mid-story removal, forest thinning, etc.). There is a direct correlation between management activities and red-cockaded woodpecker population levels.

Southern Pine Beetle (*Dendroctonus fontalis*)

This species was selected to measure the effects of forest management aimed at promoting forest health (e.g., site/soil based species selection, appropriate fire cycles, and preventing or thinning of overstocked stands). Monitoring will be conducted using southern pine beetle pheromone trapping survey. Increased index numbers will be evidence for decreased forest health.

Pileated Woodpecker (*Dryocopus pileatus*)

This species was selected to represent mature forests. It is also an indicator of snag/cavity habitat. Monitoring will be by breeding bird survey and FSVEG database in conjunction with geographic information system (GIS) analysis of mature forest stands.

Wood Thrush (*Hylocichla mustelina*)

This species is known to require large tracts of unbroken forest interior for successful breeding to occur. This will measure effectiveness of minimizing “edge” in the implementation of vegetation management program. Monitoring will be by breeding bird survey and FSVEG database in conjunction with geographic information system (GIS) analysis of mature forest stands as compared to open areas.

F.1.4 Management Indicator Species Evaluation Tables For National Forests in Mississippi by Ranger District

Management Emphasis Ranking			De Soto RD	Chickasawhay RD	Holly Springs	Yalobusha		Ackerman	Tombigbee
	Bienville	Delta	De Soto		Holly Springs		Homochitto	Tombigbee	
Hooded Warbler	1	1	1	1	1	1	1	1	1
Largemouth Bass	3	1	3	3	3	3	3	3	3
Longleaf Pine	2	x	3	3	x	x	3	x	x
Pileated Woodpecker	2	2	2	2	2	2	2	2	2
Red-cockaded Woodpecker	3	x	3	3	x	x	3	x	x
Southern Pine Beetle	3	x	3	3	3	3	3	3	3
Wood Duck	1	3	1	1	1	1	1	1	1
Wood Thrush	1	1	1	1	1	1	1	1	1

x - No known occurrence or not likely to occur on this unit.

1 - Primary objective is to avoid or minimize negative impacts.

2 - Achieve multiple resource objectives while maintaining or improving current conditions.

3 - Priority placed on improving conditions with other resource objectives becoming secondary.

NFS Habitat Niche			De Soto RD	Chickasawhay RD	Holly Springs	Yalobusha		Ackerman	Tombigbee
	Bienville	Delta	De Soto		Holly Springs		Homochitto	Tombigbee	
Hooded Warbler	1	1	1	1	1	1	1	1	1
Largemouth Bass	1	1	1	1	1	1	1	1	1
Longleaf Pine	2	x	2	2	x	x	2	x	x
Pileated Woodpecker	1	1	1	1	1	1	1	1	1
Red-cockaded Woodpecker	3	x	3	3	x	x	3	x	x
Southern Pine Beetle	1	x	1	1	1	1	1	1	1
Wood Duck	1	1	1	1	1	1	1	1	1
Wood Thrush	2	2	2	2	2	2	2	2	2

x - No known occurrence or not likely to occur on this unit.

1 - Similar habitat conditions are commonly found across both federal and private ownerships.

2 - NFS lands provide habitat niche generally not common on other lands in the state.

3 - NFS managed lands provide unique habitat conditions essential to the species.

Management Influence Ranking			De Soto RD	Chickasawhay RD	Holly Springs	Yalobusha		Ackerman	Tombigbee
	Bienville	Delta	De Soto		Holly Springs		Homochitto	Tombigbee	
Hooded Warbler	1	1	1	1	1	1	1	1	1
Largemouth Bass	3	1	3	3	3	3	3	3	3
Longleaf Pine	3	x	3	3	x	x	3	x	x
Pileated Woodpecker	2	2	2	2	2	2	2	2	2
Red-cockaded Woodpecker	3	x	3	3	x	x	3	x	x
Southern Pine Beetle	3	x	3	3	3	3	3	3	3
Wood Duck	1	2	1	1	1	1	1	1	1
Wood Thrush	2	2	2	2	2	2	2	2	2

x - No known occurrence or not likely to occur on this unit.

1 - Influence considered low or questionable, other outside factors may pose an equal or greater influence.

2 - Influence considered an important (principal) factor for affecting changed conditions.

3 - Positive change in conditions is dependent upon or has a direct correlation to management actions.

Average Composite Rankings			De Soto RD	Chickasawhay RD	Holly Springs	Yalobusha		Ackerman	Tombigbee	Composite ranking sum	Composite ranking average
	Bienville	Delta	De Soto		Holly Springs		Homochitto	Tombigbee			
Red-cockaded Woodpecker	9		9	9			9			36.0	9.0
Longleaf Pine	7		8	8			8			31.0	7.8
Southern Pine Beetle	7		7	7	7	7	7	7	7	56.0	7.0
Largemouth Bass	7	3	7	7	7	7	7	7	7	59.0	6.6
Pileated Woodpecker	5	5	5	5	5	5	5	5	5	45.0	5.0
Wood Thrush	5	5	5	5	5	5	5	5	5	45.0	5.0
Wood Duck	3	6	3	3	3	3	3	3	3	30.0	3.3
Hooded Warbler	3	3	3	3	3	3	3	3	3	27.0	3.0

Proposed management indicator species having an average composite ranking average of 5 or greater were carried forward as management indicator species.

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Appendix G -
Ecosystems and Species Diversity Report

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Appendix G
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Appendix G - Ecosystems and Species Diversity Report

G.1 Introduction

National Forest Management Act (NFMA) regulations (1982) require that habitat be managed to support viable populations of native and desirable non-native vertebrates within the planning area (36 CFR 219.19). Additionally, USDA regulation 9500-004 (1983) reinforces the NFMA viability regulation by requiring that habitats on national forests be managed to support viable populations of native and desired non-native plants, fisheries, and wildlife. These regulations focus on the role of habitat management in providing for species viability. Supporting viable populations involves the proper distribution of habitat capable of maintaining interacting populations at levels that result in continued existence of the species.

The National Forests in Mississippi (Forests) support high levels of biological diversity relative to other regions. Viewed at both national and global scales, a large number of species are present for which population viability may be of concern. A detailed demographic or habitat capability analysis is not practical for all of these species. Therefore, our goal for this evaluation is to use a clearly defined, transparent process to identify species for which there are substantive risks to maintenance of viable populations, and to ensure consideration of appropriate habitat management strategies to reduce those risks to acceptable levels where feasible.

The ecological sustainability framework used to support forest plan revision for the National Forests in Mississippi is built on a foundation of ecological system diversity. By restoring and maintaining the key characteristics, conditions, and functionality of native ecological systems, the National Forests in Mississippi should be able to not only improve ecological system diversity but also provide for the needs of diverse plant and animal species on the forest. This report describes the analysis process used to identify, evaluate, and develop guidance for sustaining ecological diversity. This report and the ecological sustainability evaluation database from which it was derived not only provide the overall framework for many of the forest plan components and the systems-based direction in the revised forest plan, but are also expected to be an important source of data and guidance for sustaining native ecological systems and species when implementing the forest plan.

Because NFMA regulations require providing habitat for species viability within the planning area, the focus of this evaluation is on habitat provided on national forest land. Although surrounding private lands may either contribute to or hinder the maintenance of species viability on national forest land, private lands are not relied upon to meet regulation requirements. For this reason, habitat abundance was assessed based on conditions found on national forest land. Habitat distribution was assessed considering the condition of intermixed ownerships and conditions, which in turn may affect the interactions of species among suitable habitat patches on national forest land. While most plant and animal species needs are expected to be met by sustaining ecosystem diversity, a species-specific analysis was conducted to evaluate whether additional provisions were needed for federally listed species, regional forester's sensitive species, and locally rare species.

Much of the information used in this evaluation was compiled by NatureServe under a participating agreement with the Forest Service. NatureServe is an international non-profit organization, formerly part of the Nature Conservancy. Its mission is to develop, manage, and distribute authoritative information critical to conservation of the world's biological diversity. Partnership with NatureServe was sought as a means to ensure that the best available information on species status and habitat relationships was used in this evaluation. Under this agreement, NatureServe staff engaged numerous species experts and state

heritage programs to develop a relational database that includes relevant information on species' status, habitat relationships, and threats to viability.

G.1.1 Viability Evaluation Process

Viability risk over the next 50 years was assessed for each species in relation to its principle habitat relationships by forest plan revision alternative. Risk assessment was based on three factors: 1) current species abundance, 2) expected habitat abundance in 50 years, and 3) expected habitat distribution in 50 years (Figure G 1). Once risk ratings were developed, management strategies were assessed to estimate how well alternatives provide for species viability.

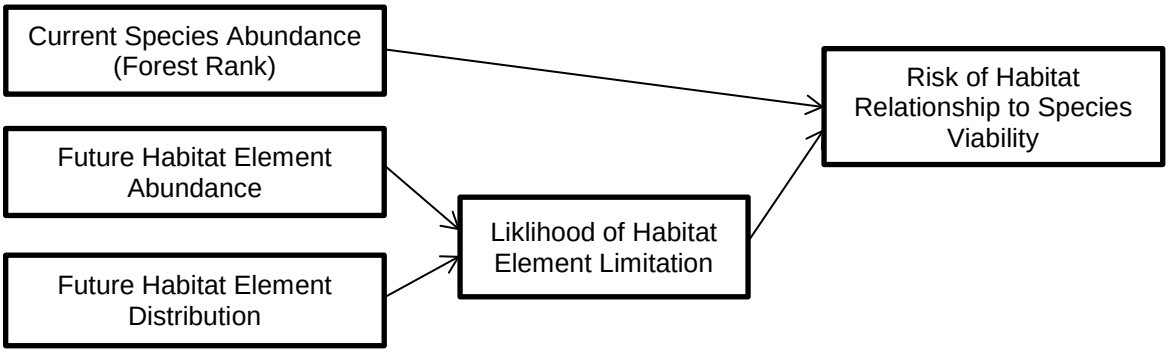
Current Species Abundance (Forest Rank)
Future Habitat Element Abundance
Future Habitat Element Distribution
Liklihood of Habitat Element Limitation
Risk of Habitat Relationship to Species Viability

Figure G 1. Relationship of variables used to rate risk to species viability

A comprehensive list of species with potential viability concerns was compiled for the National Forests in Mississippi. The list includes those species found, or potentially found, on the Forests from the following categories:

- species listed as proposed, threatened, or endangered under the federal Endangered Species Act,
- species listed on the regional forester's sensitive species list,
- species identified as locally rare on the national forest by Forest Service biologists,
- birds of conservation concern as identified by the US Fish and Wildlife Service, declining species of high public interest, and
- species suggested by panels consisting of local experts.

Unless otherwise indicated throughout this document, the evaluation of migratory birds focuses on breeding populations only. Wintering and migrating populations were considered during planning, but viability evaluation is most accurate when viewed in terms of relative stability of breeding populations.

G.1.2 Forestwide Ecological System Sustainability

The species and ecological system sustainability evaluation framework for the National Forests in Mississippi was built around principles developed by the Nature Conservancy in their Conservation Action Planning Workbook (Nature Conservancy 2005). Although built on the Nature Conservancy structure, this document generally uses Forest Service terminology rather than the Nature Conservancy terms to refer to parts of the framework. Table G 1 provides a crosswalk between relevant Forest Service and Nature Conservancy terminology.

Table G 1. Crosswalk between planning terms of the National Forests in Mississippi and the Nature Conservancy

Forest Service Terms	The Nature Conservancy Terms
Native ecological systems, threatened and endangered species, regional forester's sensitive species locally rare species	Conservation targets
Characteristics of ecological system sustainability (key characteristics), appropriate ecological conditions for specific [species]	Key ecological attributes
Performance measures	Indicators
[no equivalent]	Indicator ratings
Forest plan components	Strategies

The Forest Service developed a relational database, the ecological sustainability evaluation tool, based on the structure of the Nature Conservancy planning tool. The ecological sustainability evaluation tool served as the primary process record for the species and ecosystem diversity analysis. This tool includes documentation of scientific and other sources consulted, uncertainties encountered, and strategic choices made during development of the database. Additionally, the tool documented the many relationships among parts of the framework. For example, species were often related to one or more characteristics of ecological systems, and a given forest plan component frequently affected multiple ecological systems or species.

The following steps were used to build an ecological sustainability framework, with each step documented within the ecological sustainability evaluation tool. This iterative process was methodical and utilized sequential steps, as described below.

1. Identify and define ecological systems

To define terrestrial ecological system sustainability, all terrestrial ecological systems on the National Forests in Mississippi were identified using NatureServe's International Ecological Classification Standards (NatureServe 2004a, 2004b). Through coordination with NatureServe, systems were added, removed, or renamed (as needed) to ensure all systems on national forest land were represented. Each system was defined in terms of existing Forest Service forest types and Natural Resources Conservation Service (NRCS) soil drainage types (sections Appendix G - and G.2). All identified terrestrial ecological systems were included in the ecological sustainability framework. Current acreage of each system was calculated using Forest Service geographic information system (GIS) data.

2. Identify species

To assess species diversity, a comprehensive list of plant and animal species was compiled by combining species lists from a variety of sources, including: federally-listed threatened and endangered species obtained from the US Fish and Wildlife Service, State Species of Conservation obtained from the Mississippi Natural Heritage Program, State Comprehensive Wildlife Conservation Strategy, the Birds of Conservation Concern list compiled by the US Fish and Wildlife Service, and the Forest Service's list of sensitive species. Additional species were added based on input from recognized conservation experts within the state. Species were then screened for inclusion in the framework and designated as threatened and endangered, regional forester's sensitive species, or locally rare species.

3. Identify and define characteristics of ecological system sustainability and related performance measures

To identify key characteristics and performance measures for terrestrial ecological systems, a series of 8 meetings with experts knowledgeable about ecological conditions and species in Mississippi were held in January 2005. Experts reviewed lists and definitions of ecological systems and suggested important ecological characteristics and performance measures to be addressed during planning. Final determinations of ecological sustainability components were based on expert input, subsequent additional information from a variety of sources, and habitat needs of associated species.

The framework for sustainability of aquatic ecological systems was based on watersheds. Included in the ecological sustainability evaluation database were all 5th level hydrologic/watershed units (HUCs) that contained national forest land (Clingenpeel and Leftwich 2006). The framework for addressing characteristics and performance measures for watersheds was developed by regional Forest Service staff for use during national forest planning across the Southern Region. It involved use of standard GIS datasets to assess watersheds in terms of sediment loads, pollution point sources, flow modification by dams and road crossings, and riparian land use.

As performance measures were identified for both terrestrial and aquatic systems, criteria were set for rating each performance measure as poor, fair, good, and very good relative to ecological sustainability. In general, poor and fair ratings indicated areas of concern for ecological system sustainability (Table G 2). Rationale and sources used in making choices were recorded in the ecological sustainability evaluation tool.

Table G 2. Element condition scores

Range of Condition Score	Condition	Definition of ecological sustainability evaluation Score Applied To Planning Elements
3.51 - 4.0	Very Good	Element conditions are optimal; associated species' populations should remain robust and potentially even expand.
2.51 - 3.50	Good	Element conditions are acceptable; associated species' populations should remain stable.
1.51 - 2.50	Fair	Element conditions are slightly inadequate; although associated species' populations may persist for some time, they may be subject to gradual decline.
1.00 - 1.50	Poor	Element conditions are severely inadequate. Associated species' populations are expected to severely decline; localized extirpations are occurring or are imminent.

4. Link species to the ecological systems and watersheds and identify any additional needs of species

In the January 2005 meetings, experts helped link terrestrial and aquatic species to ecological systems and watersheds in which they occur. It was determined that species' needs were best met when species were grouped before linking them to systems and, in particular, characteristics (key attributes) of systems that specifically address a given species groups needs. This linkage allowed us to assess how well the ecological system and watershed frameworks covered needs of these species. Where ecological conditions for these species were not covered by the ecological sustainability framework, additional characteristics, performance measures, and rating criteria were added so these species would be covered. Therefore, all species have their needs covered by ecological sustainability framework, or a combination of the ecological sustainability framework and other additional forest plan components.

5. Assess current condition of performance measures

Current values and ratings of all performance measures were estimated using a variety of methods. Many current values were derived through analysis of existing GIS databases. Assumptions and methods for determining current values and ratings are recorded in the ecological sustainability evaluation tool.

6. Develop Forest Plan components

Forest plan components were proposed with the goal of providing ecological system sustainability and ecological conditions for identified species based on the ecological sustainability evaluation tool. In some cases, current requirements and processes outside of the planning process were identified that address this goal. All elements of the ecological sustainability framework will be addressed by appropriate management direction in the forest plan.

7. Assess future outcomes

To assess the adequacy of proposed management direction under different alternatives, values and ratings of performance measures were projected 10 and 50 years into the future. Many of these projected values were derived from a series of spreadsheets that were developed to predict ecological system type heterogeneity and vegetation structural conditions that would result from implementing proposed management activities. For some watershed performance measures, a model was used to predict changes in sediment load resulting from the estimated levels of activities. Where projected outcomes were rated as poor or fair, adjustments to forest plan components were made (where possible) to improve these outcomes. In some cases, improving expected outcomes to good and very good ratings was not possible due to factors beyond Forest Service control (i.e., limits to expected budgets and program levels, and trade-offs with other uses).

This report serves as a description of background, current status, and desired conditions for ecological systems on the National Forests in Mississippi. Current conditions for ecological system characteristics reported here are based on a "snapshot in time." Conditions on the Forests are constantly changing and new techniques improve how data can be used to measure progress. Data should be updated in 5-year intervals to measure progress towards achieving desired conditions.

G.1.3 Ecological System Sustainability Characteristics

In order to evaluate ecological sustainability, it is important to assess the ecological processes, ecological system composition, and structural characteristics important to the long-term persistence of ecological systems on the Forests. The following characteristics are important to all ecological systems, and are grouped here because they have forestwide optimal conditions that cross ecological system boundaries and support long term sustainability of the landscape as a whole.

Relative Abundance

Relative abundance is defined as the percentage of each ecological site type covered by the appropriate ecological system. Ensuring that native ecological systems occur on appropriate sites is important in sustaining ecological and species diversity in Mississippi. This key component will be covered in the revised forest plan by the forestwide and individual ecological system desired condition statements and objectives. Section G.5.1 lists each national forest and the desired condition for relative abundance.

Non-native Invasive Species

Non-native invasive species, including both flora and fauna, can have severe detrimental effects on native species and are problematic across the Forests. Preliminary, current, and projected data all indicate non-native invasive species are widespread on all units and will continue to persist despite any aggressive

efforts to treat non-native invasive species by the Forests. The desired target for control of non-native invasive species is to maintain or reduce the percent coverage of invasive exotic plants to three percent or less across the Forests. Special emphasis for achieving this target should be placed on threatened and endangered habitat and rare communities that are most likely to have negative impacts from invasive plant and animal species. This issue will be addressed in the revised forest plan under forestwide desired conditions, objectives for eradication and treatment of non-native invasive species, and guidelines to help control non-native invasive species at the project level.

Structure (old-growth forest)

Old-growth forest is an important structural component of the forest and is vital to sustaining species diversity. The desired condition is to maintain a minimum of 10 percent of forested lands in old-growth condition across the Forests. This percentage of old-growth should represent a mix of forested ecological systems with emphasis on rare systems.

Structure and Tree Age Diversity

Structure and age diversity are both important characteristics of forested ecological systems. Every forested community consists of a mixture of age-classes and a diversity of vertical structure (Table G 3), with young growth replacing losses due to natural decadence, storm events, pest infestations, and wildfires. Structure is also important to non-forested systems such as grasslands and shrub/scrub habitats.

Table G 3. Definitions of structural classes

Structural Class	Definition
Mature Closed Canopy Forest	Forest over a certain size or age with overall canopy closure (all layers) greater than 80 percent. (Our typical undisturbed second growth forest). Includes natural canopy gaps.
Mature Open Canopy Forest	Forest over a certain size or age with overall canopy closure of 60-80 percent. (typical of thinned forests)
Mature Woodland	Forest over a certain size or age with overall canopy closure of 10-60 percent. (typical of ecologically restored woodland and savannas)
Mixed-age Forest	Forest with two or more dominant tree ages, typical of natural regeneration after seedtree or shelterwood harvests.
Young / Mid-aged Forest	Even-aged stands of small to medium size or aged trees (pole timber or immature sawtimber).
Regenerating Forest Shrubland	Even-aged stands less than 5-10 years of age (shrub stage).
Regenerating Forest Grassland	Even-aged stands less than 5 years of age (grass/forb/seedling stage).
Open	Land with less than 10 percent canopy cover in permanent or long-term open condition (grasslands, barrens, etc.; not newly cut forest regeneration.)

An appropriate balance of vertical structure within each community provides critical habitat for associated species that require either early seral (grass/forb-seedling/shrub), mid-seral (poletimber – hardwoods 5-11 inches diameter breast height (d.b.h.); pines 5-9 inches d.b.h.), and late seral (sawtimber-hardwoods greater than 11 inches d.b.h.; pines greater than 9 inches d.b.h.). The overall quantity and distribution of vertical structure contributes to the sustainability and diversity of the ecological communities by providing a mix of early seral, immature, and mature stands. Early seral was designated as all known acres of each system in regeneration, seedling, or non-stocked condition. Immature stands were defined as all known acres of each system in the poletimber condition. Mature stands were defined as all known acres of each ecological system in the sawtimber condition.

Canopy closure, as a surrogate for horizontal structure, was measured as a combination of stem density, basal area and extent of canopy cover. This measure was used primarily to delineate forested (closed canopy) from open canopy conditions.

Fire Regime

Fire regime performance measures include landscape-scale fire in surrounding/adjacent habitats allowing for distribution and dispersal of fire-dependent species, and encompass Fire frequency and seasonality. Fire frequency was measured as the average percent of all known community occurrences plus 100 meter buffer burned at the appropriate interval. Seasonality was measured as the percent of each community burned during the period of growth from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to pre-quantify ideal intensity objectives at a forestwide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity. The revised forest plan will provide guidance on desired conditions for each ecological system.

Remoteness (road and trail density)

Remoteness, referred to as “distance from roads” in the ecological sustainability evaluation database, is a measure of the average density of roads and trails (miles per square mile) within a community type at the landscape scale, and is an important characteristic of ecological system sustainability. High road density can cause habitat fragmentation, increase the spread of invasive vectors, and negatively impact species which are susceptible to direct mortality from vehicles. The desired condition is to maintain or restore where necessary road and trail density to no more than 1.0 mile per square mile across the forest. As a general rule, roads should not bisect or be located within rare communities and should not alter the hydrologic function of ecological systems. However, many roads that bisect national forest lands are outside of Forest Service jurisdiction and, therefore, cannot be unilaterally closed without cooperation from local, state and other federal agencies. Forest plan guidance will provide for aquatic organism passage and provides guidelines to protect rare and wetland communities from negative effects of roads.

G.2 Ecological Systems

The following sections describe the 22 ecological systems identified for the National Forests in Mississippi. Each description includes appropriate background material on the historic range and composition of the ecological system, desired ecological conditions, recommended management strategies, principal ecological system characteristics, performance measures, and potential threats.

G.2.1 Upland Longleaf Pine Forest and Woodland

Upland Longleaf Pine Forest and Woodland Ecological System Characteristics

Abundance of the longleaf pine forest ecological system on the landscape is the most important characteristic of this system due to its widespread conversion to other forest types over the past century as a result of agricultural clearing, forest management, and fire suppression. Restoration of the longleaf pine forest ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system.

Herbaceous Groundcover is an ecologically essential characteristic of the pine-dominated ecosystems in the southeastern coastal plain ecoregions of the United States.

Understory Composition Guidance: This ecosystem includes midstories that are sparse and typically dominated by scrub oaks and other fire-tolerant hardwoods. The understory should be open and dominated by dense native grasses and forbs, the density of which are dependent on local soil conditions

Fire regime is a process fundamental to long-term sustainability of this ecological system. Many species associated with it are dependent upon fire to maintain open canopy conditions. Under historical reference conditions, fire is believed to have been frequent enough to limit development of fire-intolerant hardwoods and both loblolly and shortleaf pines. Fire also stimulated rich understories of grasses and forbs. Fire suppression has led to increases in overstory canopy and shrub densities, reducing densities of grass-forb understories. Plant species diversity in these understories also has been adversely affected by intensive grazing and mechanical site preparation in some places. Management activities are frequently needed to restore longleaf pine overstories, open canopies, historical fire regimes, and characteristic grass-forb understories.

Canopy structure is an attribute essential to species diversity and long-term sustainability of this ecological system and its associated components. Open longleaf pine forests provide foraging and nesting opportunities for many species, including the federally threatened gopher tortoise and associated species.

Tree age diversity is a characteristic important to the longleaf pine ecological system. Mature forest and woodland (including old-growth) in this system provide a variety of nesting and foraging opportunities for many species and provide adequate fine fuels to carry fire throughout the system. Maintaining a sustainable mix of tree ages is important to long-term stability of the ecological system.

Upland Longleaf Pine Forest and Woodland Desired Ecological Condition

Overstories are typically dominated by longleaf pine with relatively low frequencies of oaks, other hardwoods, and other yellow pines. Scattered clumps of hardwoods occur on xeric sites in this ecological system. Midstories are sparse and typically dominated by scrub oaks and other hardwoods. Understories are open and dominated by dense growth of grasses and forbs.

This system supports populations of associated threatened and endangered species, including the endangered red-cockaded woodpecker, the threatened gopher tortoise, and dusky gopher frog. Where conditions are appropriate, several rare communities are typically embedded within this larger system including herbaceous seepage bogs, xeric sandhills, and depression ponds.

The longleaf pine forests and woodlands are composed of a wide range of age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest and woodlands may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-25 acres. Regenerating longleaf pine forest and woodland (0-10 years old) comprise 1-10 percent of system acreage once conversion from non-target species has occurred, with the proportion of regenerating forest possibly exceeding 10 percent during the conversion. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodland. Residual snags and live overstory trees may form a sparse overstory resulting in a two-aged forest. Mature forest and woodland (60 years old or older) comprise approximately 65 percent of system acreage, which includes 10 percent of system acreage in old-growth.

Forests and woodlands are open to very open, with canopy closure in mature examples of this system being less than 80 percent (often less than 60 percent), especially within gopher tortoise habitat. Open conditions are maintained with fire, which occurs on an average return interval of 1-3 years; approximately 40 percent of fires occur during the growing season.

Upland Longleaf Pine Forest and Woodland Management Strategy

Strategies for restoring, maintaining, and enhancing the longleaf pine ecological system should emphasize the appropriate fire regime, thinnings, and gap creation to promote and maintain the desired ecological system structure. Some restoration is expected to occur during the first decade of implementation; however the primary focus is on improving existing stands to manage for federally threatened and endangered species. Restoration remains a long-term goal for longleaf pine forests on the Forests, but the rate of progress will be slow given current program levels and competing Forest plan needs. Tools such as stewardship programs and collaboration with partners offer opportunities to foster longleaf restoration.

Restoring the Canopy: Where longleaf is still present, appropriate fire frequency, seasonality, and intensity may be sufficient to encourage the gradual return of longleaf dominance. Where longleaf is absent, manual or mechanical plantings may be required and should be executed in ways that minimize disturbance of the already-restored groundcover in high-function loblolly and slash occurrences.

Most upland sites dominated by slash or loblolly pine on National Forest lands in Mississippi are artifacts of reforestation activities of the twentieth century. During the early and mid twentieth century, the science and technology of the time did not allow for replanting of longleaf pine after virgin longleaf forests were harvested. As a result, slash and loblolly pines were introduced under different management-emphasis regimes that focused on reforestation, game species and fire suppression. While the restoration of more ecologically rich and sustainable longleaf systems can be a decades- or centuries-long long, labor-intensive and expensive process, much of the ecological function associated with longleaf systems can be restored relatively quickly and easily by first transitioning existing slash and loblolly occurrences through "high-function" slash and loblolly phases.

For the purposes of this planning process, high-function loblolly and slash pine phases are defined as those in which the fire and canopy regimes are sufficient to restore all or most of the understory/groundcover composition and structure normally associated with healthy, sustainable longleaf pine-dominated systems despite the differences in overstory composition. The presence of mature dominate canopy trees capable of supporting, or already supporting, the endangered red-cockaded woodpecker is an additional indicator of high-function and takes precedence over longleaf restoration activities. Thinning cuts and some reseeding may be required to assure the proper groundcover assemblages but, with appropriate fire regimes, these activities should be fairly easy to accomplish in order to achieve high-function loblolly and slash phases in a relatively short period of time when compared to other restoration methods.

We recognize that groundcover vegetation is the primary attribute required to support much of the biodiversity normally associated with healthy longleaf systems. We also simultaneously acknowledge that there are subtle and, in many cases, poorly understood ecological functions that require longleaf-dominated canopies for these systems to be considered fully restored. Accordingly, high-function loblolly and slash occurrences should be considered only partially restored and restoration efforts should continue until both the overstories and understories meet the criteria for fully restored longleaf systems.

Upland Longleaf Pine Forest and Woodland Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 4. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 4. Upland longleaf pine forest and woodland key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Distance from Roads	Paved Open Road Density (Road miles per sq. mile)	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density (Road miles per sq. mile)	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density (Road miles per sq. mile)	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density (Road miles per sq. mile)	>2.0	1.26-2	0.26-1.25	<0.25
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<45 or >75	45-49 or 71-75	50-54 or 66-70	55-65
	% Regenerating Forest	0 or >15	11-15	1-5	6-10
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Understory Composition	Compliance with Understory Composition Guidance	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85

G.2.2 Shortleaf Pine-Oak Forest and Woodland

Shortleaf Pine-Oak Forest and Woodland Ecological System Characteristics

Abundance of the shortleaf pine-oak forest and woodland ecological system on the landscape is the most important characteristic of this system, due to its widespread conversion to other forest types over the past century as a result of agricultural clearing, forest management, and fire suppression. Restoration of the shortleaf pine-oak forest and woodland ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Species diversity and richness are dependent upon fire to maintain open canopy conditions and floristic composition.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Open shortleaf pine forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the shortleaf pine ecological system. Mature forest and woodland (including old-growth) in this system provide a variety of nesting and foraging opportunities for many species and provide adequate fine fuels to carry fire throughout the system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Shortleaf Pine-Oak Forest and Woodland Desired Ecological Condition

Over-stories are typically dominated by shortleaf pine grading into stands with a mixture of upland hardwoods and other yellow pines. More typical are areas in which oaks, hickories, sweetgum, yellow poplar, maples, and blackgum have become prominent in the mid-story and overstory and herbaceous patches are rare. Under-stories are dominated by dense growth of grasses and forbs. This system supports populations of associated rare species, including Bachman's sparrow and the northern bob-white. Where suitable site conditions exist, several rare habitats are typically embedded within this larger system including rock outcrops, seeps, springs, and seepage swamps, and ephemeral ponds and emergent wetlands. Where site conditions are appropriate, these habitats are present and functioning within the larger system.

Ages of diagnostic tree species are diverse, providing a sustained availability of forests and woodlands across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest and woodland may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-25 acres. Regenerating forest and woodland (0-10 years old) comprise approximately 1-10 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest and woodland (60 years old or older) comprise approximately 65 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests and woodlands are open to very open, with canopy closure in mature examples of this system being less than 80 percent. Open conditions are maintained with fire, which occurs on an average return interval of 1-3 years with approximately 40 percent of fires occurring during the growing season.

Shortleaf Pine-Oak Forest and Woodland Management Strategy

Forest strategies for restoring, maintaining, and enhancing the shortleaf pine-oak forest and woodland ecological system should emphasize restoring the appropriate fire regime and using thinnings and even-aged and uneven-aged regeneration activities during the first decade of Forest plan implementation. Restoration of this ecological system remains a long-term goal for shortleaf pine-oak forests on the Forests, but not one that will be immediately implemented given current program levels and competing needs. Tools such as stewardship programs and collaboration with partners offer opportunities to foster shortleaf pine-oak forest and woodland restoration.

Shortleaf Pine-Oak Forest and Woodland Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 5. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 5. Shortleaf pine-oak forest and woodland key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<45 or >75	45-49 or 71-75	50-54 or 66-70	55-65
	% Regenerating Forest	0 or >15	11-15	1-5	6-10
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85

G.2.3 Loblolly Forest

Loblolly Forest Ecological System Characteristics

Abundance of the loblolly pine forest ecological system on the landscape is the most important characteristic of this system. Loblolly pine forest is widespread throughout the National Forests in Mississippi and occupies sites which historically supported other forest types. Conversion of the loblolly pine forest ecological system to appropriate ecological systems is the highest priority for long-term sustainability of the forest. However, loblolly pine and loblolly pine-hardwood forests should be retained on site types where it is native.

Loblolly Forest Desired Ecological Condition

This system is a predominately mature or old-growth forest with a diversity of vertical and age structure on sites with suitable habitat for this species and in areas where it historically occurred. Sites on which this association occurs that are not of historical occurrence are converted to the desired historical type as described in the ecological system sustainability characteristics (section G.1.3). Until restoration to

appropriate historical condition is completed, loblolly pine forests and woodlands are managed toward the desired condition for the appropriate ecological system.

Loblolly Forest Management Strategy

Restoring Native Ecosystems is a high priority across the National Forests in Mississippi. On sites where loblolly pine is not native, restoration of Upland Longleaf Pine Forest and Woodland can be enhanced by transitioning loblolly through the high-function phases described previously. Outside of the native range of longleaf, restoration to other native ecosystem types such as shortleaf-oak, hardwoods, and prairies among others, is desired.

The management strategy for loblolly pine is to restore this species to appropriate ecological diversity systems over time. Until restoration to historical forest types is completed, loblolly pine forests and woodlands should be managed toward the desired condition for the appropriate ecological system and to sustain species diversity and threatened and endangered species. Thinnings, gap creations, and even-aged and uneven-aged regeneration are important management activities to promote and maintain the desired ecological system structural conditions. Appropriate fire regimes for the future ecological system should be implemented. Restoration of appropriate ecological systems remains a long-term goal for loblolly pine forests on the National Forests in Mississippi. Tools such as stewardship programs and collaboration with partners offer opportunities to foster restoration of the appropriate ecological systems.

Loblolly Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 6. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 6. Loblolly forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of Ecological System Acres at Desired Condition	<50	50-70	71-90	>90
Invasive Species Abundance	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Reduction of Fire Ants	<30	30-69	70-89	>90

G.2.4 Southern Loblolly-Hardwood Flatwoods

Southern Loblolly-Hardwood Flatwoods Ecological System Characteristics

Abundance of the southern loblolly-hardwood flatwoods ecological system on the landscape is the most important characteristic of this system. This ecological system has remained largely intact with most maintenance work related to restoration of the species diversity component.

Fire regime is believed to be another characteristic fundamental to long-term sustainability of this ecological system. Species diversity and richness may be dependent upon fire to maintain open canopy conditions and floristic composition.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Open southern loblolly-hardwood flatwoods provide foraging and nesting opportunities for many species, but especially for the red-cockaded woodpecker.

Tree age diversity is another characteristic important to the southern loblolly-hardwood flatwoods ecological system. Mature forest and woodland (including old-growth) in this system provide a variety of nesting and foraging opportunities for many species and provides adequate fine fuels to carry fire throughout the system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Southern Loblolly-Hardwood Flatwoods Desired Ecological Condition

Southern loblolly-hardwood flatwood overstories are typically dominated by loblolly pine and associated hardwoods, especially water oak. This system supports populations of the federally endangered red-cockaded woodpeckers. Where suitable site conditions exist, several rare communities are typically embedded within this larger system including Jackson prairie, rock outcrops, and seeps, springs, and seepage swamps.

This system is dominated by mature and mid-aged forest, and a network of well-distributed old-growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Forests are open to very open, with canopy closure in mature examples of this system being less than 80 percent. Fire occurs at an interval of 1-3 years with approximately 40 percent of fires occurring in the growing season.

Southern Loblolly-Hardwood Flatwoods Management Strategy

Forest strategies for maintaining and enhancing the southern loblolly-hardwood flatwoods ecological system should emphasize restoring the appropriate fire regime and using thinnings and even-aged regeneration activities during the first decade of forest plan implementation. The goal of the Bienville NF is the maintenance of this ecological system on the Forests. Management of this system for recovery of the red-cockaded woodpecker and restoration of any embedded endemic Jackson prairie are important objectives for management of this ecological system. Tools such as stewardship programs and partnerships offer opportunities to foster these objectives.

Southern Loblolly-Hardwood Flatwoods Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 7. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 7. Southern loblolly-hardwood flatwoods key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Forest Age Diversity	% Mature Forest	<45 or >75	45-49 or 71-75	50-54 or 66-70	55-65
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85

G.2.5 Slash Pine Forest

Slash Pine Forest Ecological System Characteristics

Abundance of the slash pine forest ecological system on the landscape is the most important characteristic of this system. Slash pine forest occurs in four units of the Forests and may occupy sites which historically supported other forest types. Restoration of the slash pine forest ecological system to appropriate ecological systems is the highest priority for long-term sustainability of the forest.

Slash Pine Forest Desired Ecological Condition

This system is a predominately mature or old-growth forest with a diversity of age and vertical structure on sites where this species is appropriate and historically occurred. Areas where this association has been introduced via planting are restored to the desired historical type as described in the ecological sustainability evaluation database. Until restoration to appropriate historical condition is completed, slash pine forests and woodlands should be managed toward the desired condition for the appropriate ecological system.

Slash Pine Forest Management Strategy

The management strategy for slash pine is to regenerate it on appropriate sites over time. Slash pine is of natural occurrence on some alluvial soil sites on the De Soto NF and should be retained according to ecologically sustainable amounts. On other units, restoration to historical ecological systems from slash pine is necessary. Until restoration to appropriate historical condition is completed, slash pine forests and woodlands should be managed toward the desired condition for the appropriate ecological system. Thinnings, gap creation, and even-aged and uneven-aged regeneration are important management activities to promote and maintain the desired ecological system structural conditions. Appropriate fire regimes for the future ecological system should be restored to slash pine forests. Restoration of appropriate ecological systems remains a long-term goal for slash pine forests on the Forests. Tools such as stewardship programs and collaboration with partners offer opportunities to foster restoration of the appropriate ecological systems.

Slash Pine Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 8. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 8. Slash pine forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of Ecological System Acres at Desired Condition	<50	50-70	71-90	>90
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85
Invasive Species Abundance	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant

G.2.6 Northern Dry Upland Hardwood Forest

Northern Dry Upland Hardwood Forest Ecological System Characteristics

Abundance of the northern dry upland hardwood forest on the landscape is the most important characteristic of this system due to its widespread conversion to other forest types over the past century as a result of agricultural clearing, forest management, and fire suppression. Restoration of the northern dry upland hardwood forest ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Fire is important to achieve regeneration of desired hardwood species and maintain community function.

Canopy structure is an important characteristic for species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species. Some portions of this system will have open canopies.

Tree age diversity is another characteristic important to the northern dry upland hardwood ecological system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Northern Dry Upland Hardwood Forest Desired Ecological Condition

Overstories are typically dominated by upland oaks (post, southern red, blackjack, black and scarlet) and hickories (mockernut and sand). Often loblolly and shortleaf pines are intermingled with hardwoods. Midstories are sparse and typically dominated by dogwood, persimmon, and other hardwoods. Understories are also sparse and dominated by seedling hardwoods, shrubs and forbs. This system supports populations of associated rare species, including the worm-eating warbler and the yellow lady's-slipper. Where suitable site conditions exist, several rare habitats are typically imbedded within this larger system including rock outcrops, seeps, springs, and depression pondshores.

Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forests may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-5 acres. Regenerating forests (0-10 years old) comprise no more than 7 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 70 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Some portions of this system will have open canopies. Low intensity fire creeps into this system from the surrounding upland community and occurs on an average return interval of 1-6 years.

Northern Dry Upland Hardwood Forest Management Strategy

Forest strategies for restoring, maintaining, and enhancing the northern dry upland hardwood forests should emphasize restoring the appropriate fire regime and using thinnings, gap creation, and irregular even-aged regeneration activities. Return of relative abundance to approach historical levels is a long-term goal for upland hardwood forests on the National Forests in Mississippi, but not one that will be immediately implemented given current program levels and competing needs. Tools such as stewardship programs and collaboration with partners offer opportunities to foster upland hardwood forest and woodland restoration.

Northern Dry Upland Hardwood Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 9. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 9. Northern dry upland hardwood forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Forest Age Diversity	% Regenerating Forest	<3 or >7	3 or 7	6	4-5
	% Mature Forest	<55 or >75	55-59 or 71-75	60-65	66-70
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Invasive Species Abundance	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant

G.2.7 Southern Dry Upland Hardwood Forest

Southern Dry Upland Hardwood Forest Ecological System Characteristics

Abundance of the southern dry upland hardwood forest on the landscape is an important characteristic of this system due to its conversion to other forest types over the past century as a result of agricultural clearing, forest management, and frequent intense burns. Maintenance of the southern dry upland hardwood forest ecological system where it occurs is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. While the system did not burn frequently, it does exist within the matrix of a fire-maintained ecological system.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the southern dry upland hardwood ecological system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Southern Dry Upland Hardwood Forest Desired Ecological Condition

Southern dry upland hardwood forest overstories are typically dominated by upland oaks (post, southern red, and white) and hickories (mockernut and sand). Pines (longleaf, loblolly, and shortleaf) may be a significant species component but are not dominant. Midstories are typically dominated by dogwood and other hardwoods. Understories are sparse and dominated by seedling hardwoods, shrubs and forbs. This system supports populations of associated uncommon species, including the worm-eating warbler and the mimic glass lizard. Where site conditions are suitable, several rare communities are typically imbedded within this larger system including seeps, springs, and seepage swamps and emergent ponds and wetlands. Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-5 acres. Regenerating forests (0-10 years old) comprise no more than 3 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 80 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Low intensity fire creeps into this system from the surrounding upland community and occurs on an average return interval of 1-6 years.

Southern Dry Upland Hardwood Forest Management Strategy

Forest strategy for restoring, maintaining, and enhancing the southern dry upland hardwood forest ecological system emphasizes using natural processes to reach the desired conditions. Southern dry upland hardwoods are generally intermingled among the dominant pine ecosystems. As a result, this system will be exposed to prescribed fire with the same frequency and seasonality/intensity. Because this system burns less readily than the surrounding pine dominated systems, it is difficult to predict whether or not upland hardwoods will actually burn when exposed to fire. While it is fairly easy to predict interval of fire exposure, the actual burn rates may vary. It is especially difficult to predict seasonality/intensity due to the differences in ground cover moisture regimes between upland hardwoods and surrounding pine systems. It is considered natural and an ecologically appropriate attribute of fire behavior for embedded hardwood communities to burn at rates lower than fire exposure rates. No management activities were identified to promote and maintain the desired ecological system structural conditions other than maintaining it at its current abundance across the Forests over time.

Southern Dry Upland Hardwood Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 10. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 10. Southern dry upland hardwood forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<61	61-70 or >90	71-80	81-90
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85

G.2.8 Southern Loess Bluff Forest

Southern Loess Bluff Forest Ecological System Characteristics

Abundance of the southern loess bluff forest on loessal soils is the most important characteristic of this system due to its conversion to other forest types over the past century as a result of agricultural clearing and forest management. Restoration of the southern loess bluff forest ecological system on appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic of long-term sustainability of this ecological system. While the system did not burn frequently, it does exist within the matrix of a fire-maintained ecological system.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the southern loess bluff forest ecological system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Southern Loess Bluff Forest Desired Ecological Condition

Overstories are typically dominated by many types of hardwoods, especially cherrybark oak, water oak, swamp chestnut oak, tulip poplar, Florida sugar maple and pignut hickory, with beech and magnolia present but not numerous. The more-or-less open subcanopy contains magnolia, hornbeam, tulip poplar, red maple, and dogwood. The understory is relatively sparse and consists of shrubs and woody vines. Switchcane is a prevalent member of the shrub layer and may dominate in places. This system supports populations of associated rare species, including Webster's salamander, Swainson's warbler, and fetid trillium. Where site conditions are suitable, several rare habitats are typically imbedded within this larger system including rock outcrops, seeps, and springs.

Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-9 acres. Regenerating forest (0-10 years old) comprise no more than 5 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 80 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Fire creeps into this system from the surrounding upland community and on an average return interval of 6-20 years.

Table G 11. Southern loess bluff forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<60	60-79	80-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85

Southern Loess Bluff Forest Management Strategy

Forest strategy for maintaining and enhancing the southern loess bluff forest ecological system emphasizes using natural processes to reach the desired conditions. No management activities were

identified to promote and maintain the desired ecological system structural conditions other than maintaining it at its current abundance across the Forests over time. Restoration of this ecosystem to its appropriate system will be accomplished through conversion of loblolly pine forest.

Southern Loess Bluff Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 11. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

G.2.9 Southern Mesic Slope Forest

Southern Mesic Slope Forest Ecological System Characteristics

Abundance of the southern mesic slope forest is the most important characteristic of this system due to its conversion to other forest types over the past century as a result of agricultural clearing and forest management. Restoration of the southern mesic slope forest ecological system on appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Low intensity fire is important to achieve regeneration of desired hardwood species and maintain community function.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the southern mesic slope forest ecological system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Southern Mesic Slope Forest Desired Ecological Condition

Overstories are typically dominated by hardwoods (beech, white oak, cherrybark oak, southern magnolia), although mixed loblolly pine-hardwood conditions also exist within this system. Subcanopies are more or less open and typically contain magnolia, hornbeam, tulip poplar, red maple, and flowering dogwood. Shrubs include red buckeye, switch cane, witch hazel, and deciduous holly. The forest floor typically has a rich organic layer with abundant leaf litter. This system supports populations of associated rare species, including Webster’s salamander, bay star vine, and ravine sedge. Where site conditions are suitable, several rare habitats are typically imbedded within this larger system including rock outcrop, seeps, and springs. Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-9 acres. Regenerating forest (0-10 years old) comprise no more than 5 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 80 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Low intensity fire creeps into this system from the surrounding upland community and occurs on an average return interval of 1-6 years. Loblolly pine dominated associations on the Bienville NF are burned on an average return interval of 1-3 years.

Southern Mesic Slope Forest Management Strategy

Restoration to this ecological system will involve conversion from slash pine forest on the Chickasawhay and De Soto units and mesic loblolly pine on the Homochitto and Bienville units to historic forest types, along with thinning loblolly and slash pine throughout the Forests. Both managed and natural thinning of pines will favor establishment of mesic hardwoods over time. No additional management activities were identified to promote and maintain the desired ecological system structural conditions; rather this system should use natural processes to reach the desired condition.

Table G 12. Southern mesic slope forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<61	61-70 or >90	71-80	81-90
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85

Southern Mesic Slope Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 12. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

G.2.10 Northern Mesic Hardwood Forest

Northern Mesic Hardwood Forest Ecological System Characteristics

Abundance of the northern mesic hardwood forest is the most important characteristic of this system due to its conversion to other forest types over the past century as a result of agricultural clearing and forest management. Restoration of the northern mesic hardwood forest ecological system on appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Low intensity fire is important to achieve regeneration of desired hardwood species and maintain community function.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species

Tree age diversity is another characteristic important to the northern mesic hardwood forest ecological system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Northern Mesic Hardwood Forest Desired Ecological Condition

Overstories are typically dominated by hardwoods (beech, white oak, cherrybark oak, southern magnolia, etc). Mixed loblolly pine-hardwood conditions may exist within this system in the southern portion of the range. Subcanopies are more or less open and typically contain magnolia, hornbeam, tulip poplar, red maple, and flowering dogwood. Shrubs include red buckeye, switch cane, witch hazel, and deciduous holly. The forest floor typically has a rich organic layer with abundant leaf litter. This system supports populations of associated rare species, including Webster's salamander, American ginseng, and Turk's-cap lily. Where suitable site conditions exist, several rare habitats are typically imbedded within this larger system including rock outcrops, seeps, and springs.

Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-9 acres. Regenerating forests (0-10 years old) comprise no more than 5 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 80 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Low intensity fire creeps into this system from the surrounding upland community and occurs on an average return interval of 1-6 years.

Northern Mesic Hardwood Forest Management Strategy

Restoration to this ecological system is expected to use conversion from loblolly pine forest and be accomplished through thinning loblolly throughout the Forests. Both managed and natural thinning of pines should favor mesic hardwoods over time. First thinnings, subsequent thinning and gap creation were identified as important management activities to promote and maintain the desired ecological system structural conditions.

Northern Mesic Hardwood Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 13. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 13. Northern mesic hardwood forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<61	61-70 or >90	71-80	81-90
Invasive Species Abundance	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85

G.2.11 Floodplain Forest

Floodplain Forest Ecological System Characteristics

Abundance of the floodplain forest is an important characteristic of this system due to its conversion to other forest types over the past century as a result of agricultural clearing and forest management. Maintenance and improvement of species composition of the floodplain forest ecological system on appropriate sites is the highest priority for long-term sustainability of this ecological system.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the floodplain forest ecological system. Maintaining a sustainable mix of tree ages is important to long-term stability of the ecological system.

Species composition is another characteristic important to the floodplain forest ecological system. Wildlife species associated with this ecological system rely on a varied mix of mast-producing hardwood species to survive. The current databases are not designed to track the improvement of species composition. Forest plan direction emphasizes having species appropriate to the site across the landscape, and it is assumed that removing off-site species and allowing natural succession to occur will be sufficient to sustain populations of a variety of mast-producing trees and associated species. As new data becomes available, it should be incorporated into the corporate database to ensure that species can be sustained.

Floodplain Forest Desired Ecological Condition

Bottomland hardwood tree species such as beech, white oak, cherrybark oak and southern magnolia are present in the canopy, although mesic hardwood species are present in areas less frequently flooded. Mixed loblolly pine-hardwood conditions may exist within this system. Midstories are sparse and typically dominated by upper canopy species, although hornbeam, yellow poplar, red maple, and flowering dogwood are also present. Shrubs include red buckeye, switch cane, witch hazel, and deciduous holly. Switchcane is a prevalent member of the shrub layer and may dominate in places. Understories are generally open with sparse grass, forb and woody vine species. Drift piles and standing dead trees decompose naturally on the ground. The forest floor typically has a rich organic layer with abundant leaf litter. Canebrakes are scattered along streams in appropriate sites. This system is shaped by healthy hydrologic functions and processes. Several populations of rare species are associated with this system, including the endangered Louisiana quillwort, Rafinesque's big-eared bat, southeastern myotis, American ginseng, and Turk's cap lily. It also supports demand species such as the eastern wild turkey, river otter, and mink. Where suitable site conditions exit, several rare habitats are typically imbedded within this larger system including canebrakes, beaver ponds, seeps, springs, and cypress dominated wetlands.

This system is dominated by mature forest and woodland (60 years old or older), and a network of well-distributed old-growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest occur in small scattered patches (less than 2 acres). Regenerating forest (0-10 years old) comprise no more than 5 percent of system acreage. Woody debris and snags are abundant throughout the forest. Mature forest (60 years old or older) comprises approximately 90 percent of system acreage, with 10 percent of the mature forest in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Low intensity fire occasionally creeps into the system from the surrounding upland community.

Floodplain Forest Management Strategy

Forest strategy for restoring, maintaining, and enhancing the floodplain forest ecological system emphasizes using natural processes to reach the desired conditions. However, an integrated vegetation management approach for restoration to this ecological system should emphasize thinnings of loblolly pine and mixed pine hardwoods to promote hardwood regeneration and conversion to floodplain forest over time. Both managed and natural thinning of pines will favor mesic hardwoods over time. Thinnings and gap creation were identified as important management activities to promote and maintain the desired ecological system structural conditions.

Floodplain Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 14. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 14. Floodplain forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Forest Age Diversity	% Mature Forest	<64	64-74 or >95	75-84	85-95
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Invasive Species Abundance	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85

G.2.12 Lower Mississippi River Bottomland and Floodplain Forest

Lower Mississippi River Bottomland and Floodplain Forest Ecological System Characteristics

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the lower Mississippi River bottomland and floodplain forest ecological system. Maintaining a sustainable mix of tree ages is important to long-term stability of the ecological system.

Lower Mississippi River Bottomland and Floodplain Forest Desired Ecological Condition

Bottomland hardwood tree species, such as Nuttall oak, overcup oak, honey locust, and American elm, are present and diagnostic in the canopy. Midstories are sparse and typically dominated by upper canopy species. Understories are generally open with sparse grass, forb and woody vine species. The forest floor typically has a rich organic layer with abundant leaf litter. Canebrakes are scattered throughout the system in appropriate sites. This system is shaped by healthy hydrologic functions and processes. It supports populations of associated rare species, including the endangered pondberry, the threatened Louisiana black bear, Rafinesque's big-eared bat, southeastern myotis, and the red milk snake. It also supports demand species such as waterfowl and white-tailed deer, and the unique black Delta fox squirrel. Where

site conditions are suitable, several rare communities are typically embedded within this larger system including canebrakes, beaver ponds, seeps, springs, and cypress dominated wetlands. Riparian areas buffer the effects of forest management practices on water quality.

This system is dominated by mature forest and woodland (60 years old or older), and a network of well-distributed old-growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest occur in small scattered patches (less than 3 acres). Regenerating forest (0-10 years old) comprises approximately 5 percent of system acreage. Woody debris and snags are abundant throughout the forest. Mature forest (60 years old or older) comprises approximately 90 percent of system acreage, with 10 percent of the mature forest in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent.

Lower Mississippi River Bottomland and Floodplain Forest Management Strategy

Forest strategy for restoring, maintaining, and enhancing the lower Mississippi river bottomland and floodplain forest emphasizes using natural processes to reach the desired conditions. However, an integrated vegetation management approach should emphasize improvement of species composition and maintenance of mature structural condition. Natural processes are expected to contribute significantly to attaining the desired conditions within this system. Thinnings, gap creation, irregular even-aged regeneration, and uneven-aged management regeneration were identified as important management activities to promote and maintain the desired ecological system structural conditions.

Table G 15. Lower Mississippi River bottomland and floodplain forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<100	<100	100	100
Forest Age Diversity	% Mature Forest	<40 or >95	40-69	70-84	85-95
	% Regenerating Forest	0 or >10	6-10	1 or 5	2-4
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Closed Canopy	<65	65-74	75-85	>85

Lower Mississippi River Bottomland and Floodplain Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 15. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

G.2.13 Near-coast Pine Flatwoods

Near-coast Pine Flatwoods Ecological System Characteristics

Abundance of the near-coast pine flatwoods ecological system on the landscape is an important characteristic of this system due to the past conversion of this forest type to slash pine. Planting slash pine involved the use of fertilization and bedding, resulting in an altered hydrologic regime and species composition.

Fire regime is a major characteristic fundamental to long-term sustainability of this ecological system. Many species associated with this system are dependent upon fire to maintain open conditions.

Canopy structure is the most important characteristic to species diversity and long-term sustainability of this ecological system. Structure in this system has been greatly altered by past forest management practices.

Near-coast Pine Flatwoods Desired Ecological Condition

The amount of woody vegetation is variable, but canopy closure is generally less than 60 percent. Vegetative condition is characterized by widely scattered longleaf or loblolly pine and in mesic sites by scattered slash pine. Understory conditions range from densely shrubby to open and herbaceous-dominated, based largely upon fire regime. Fire occurs at an interval of 1-3 years with no less than 40 percent of fires occurring in the growing season. Effects of past beddings and fertilization are no longer evident. This system supports populations of associated rare species, including the endangered red-cockaded woodpecker and the rare flame flower. Where site conditions are appropriate, herbaceous seepage bogs and flats are imbedded within this larger system.

Near-coast Pine Flatwoods Management Strategy

Forest strategy for restoring, maintaining, and enhancing the near-coast pine flatwoods ecological system emphasizes using natural processes to reach the desired conditions. Additionally, integrated fire and vegetation management programs should emphasize restoring this system to open conditions and neutralizing the effects of past management practices. Woodland thinning was identified as an important management activity to promote and maintain the desired ecosystem structural conditions. Many of the acres of this system cannot be treated commercially due to the wet environment; however, non-commercial treatments can be applied as opportunities arise (stewardships and partnerships). Natural processes also should contribute to achieving desired conditions.

Near-coast Pine Flatwoods Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 16. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 16. Near-coast pine flatwoods key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Open	<70	70-79	80-89	90-100

G.2.14 Xeric Sandhills

Xeric Sandhills Ecological System Characteristics

Abundance of the xeric sandhill ecological system on the landscape is an important characteristic of this system, due to its widespread conversion to other forest types as a result of agricultural clearing, forest management, and fire suppression. Restoration of the xeric sandhill ecological system to appropriate sites is a high priority for long-term sustainability of this system.

Fire regime is another characteristic necessary for the long-term sustainability of this ecological system. Many species associated with this system are dependent upon fire to maintain open canopy conditions.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Open and woodland conditions provide foraging and nesting opportunities for many species. Woodlands are ideal habitat for the federally threatened gopher tortoise and associated species.

Xeric Sandhills Desired Ecological Condition

This ecological system is managed primarily for recovery of the federally threatened gopher tortoise. Examples of this system are in an open to woodland condition with canopy closure typically less than 60 percent. Dominant tree species include longleaf pine, bluejack oak, turkey oak, and other oaks. Groundcover is sparse and open conditions and fire occurs at an interval of 1-3 years with approximately

40 percent of the fires occurring in the growing season. Ephemeral ponds and wetlands are embedded within this system and provide quality habitat for a diversity of native species.

Xeric Sandhills Management Strategy

Forest strategy for restoring, maintaining, and enhancing the xeric sandhills ecological system emphasizes using fire and woodland thinning to restore habitat suitable for use by the federally threatened gopher tortoise and its associated species. Xeric sandhills are embedded in the surrounding longleaf pine matrix and is therefore subject to treatments, particularly fire, applied at the landscape level to the surrounding matrix. While some xeric sandhill occurrences are well mapped by soil type, additional soil and site types supporting xeric sandhill ecosystems remain unmapped. More thorough mapping of this ecosystem is an important data need.

Xeric Sandhills Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 17. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 17. Xeric sandhills key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<45 or >75	45-49 or 71-75	50-54 or 66-70	55-65
	% Regenerating Forest	0 or >15	11-15	1-5	6-10
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Understory Composition	Compliance with Understory Composition Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant

G.2.15 Rock Outcrops

Rock Outcrops Ecological System Characteristics

Rock outcrops are limited in occurrence on the Forests. Characteristics important to sustaining this ecological niche include structure of the surrounding forest matrix and protection from human disturbance.

Rock Outcrops Desired Ecological Condition

Rock outcrops are present and undisturbed on the landscape, typically within mature or old-growth, closed-canopy forests. No impacts from upslope erosion and soil disturbance are evident. Human interaction with outcrops is limited and human disturbance is not evident.

Rock Outcrops Management Strategy

Human interaction such as littering, graffiti, and traffic can cause negative impacts to species associated with rock outcrops. Therefore, these areas should be buffered with mature closed canopy hardwoods and management activities should be limited in areas where rock outcrops occur. Rock outcrops should be inventoried with effort made to determine moisture regime and community diversity for each outcrop.

Rock Outcrops Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 18. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 18. Rock outcrops key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant

G.2.16 Black Belt Calcareous Prairie and Woodland

Black Belt Calcareous Prairie and Woodland Ecological System Characteristics

Abundance of the black belt calcareous prairie and woodland ecological system on the landscape is the most important characteristic of this system due to nearly total conversion to other forest types over the past century as a result of agricultural clearing, forest management, and fire suppression. Restoration of the black belt calcareous prairie and woodland ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Many species associated with it are dependent upon fire to maintain open conditions.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Open prairie provides ideal habitat for many rare species.

Black Belt Calcareous Prairie and Woodland Desired Ecological Condition

Prairie species such as indiangrass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, purple cone-flowers, prairie cone-flowers, and others dominate the landscape. Woody vegetation is scattered and consists of characteristic prairie species such as post oak, rock chestnut oak, blackjack oak, and some eastern red cedar. Sparse woody vegetation surrounds the prairie and allows distribution and dispersal of

prairie obligate species. Fire occurs at an interval of 1-3 years with no less than 40 percent of fires occurring in the growing season. This system supports populations of associated rare species, including the prairie kingsnake, white-flowered beardtongue, Mead's sedge, and rough rattlesnake-root.

Black Belt Calcareous Prairie and Woodland Management Strategy

The most important aspect for continued survival of prairie species is that all prairie soils are restored to and maintained at an open prairie condition. Since the soils are limited in occurrence, new prairie soil sites cannot be created; however, existing sites can be restored through removal of canopy species and return of appropriate fire regimes. Program strategies should emphasize removal of non-native invasive species, retention of native hardwood species mentioned above (as appropriate), and improvement of fire regimes. Reintroduction of prairie species may be necessary but should only be considered as a last resort if species are not naturally repopulating the prairie. Program strategy supports the development of rapid assessment protocols to ensure protection and sustainability of the system.

Black Belt Calcareous Prairie and Woodland Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 19. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 19. Black belt calcareous prairie and woodland key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<75	75-89	90-94	>95
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Open	<85	85-89	90-94	>94

G.2.17 Jackson Prairie and Woodland

Jackson Prairie and Woodland Ecological System Characteristics

Abundance of the Jackson prairie and woodland ecological system on the landscape is the most important characteristic of this system, due to its almost total conversion to other forest types over the past century as a result of agricultural clearing, forest management, and fire suppression. Restoration of the Jackson prairie and woodland ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Many species associated with it are dependent upon fire to maintain open conditions.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Open prairie provides ideal habitat for many rare species.

Jackson Prairie and Woodland Desired Ecological Condition

Prairie species such as indiangrass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, purple cone-flowers, prairie cone-flowers, and others dominate the landscape. Sparse woodland condition surrounds the prairie and allows distribution and dispersal of prairie obligate species. Woody vegetation is scattered and consists of characteristic prairie species such as hawthorns and crabapples. Fire occurs at an interval of 1-3 years with approximately 40 percent of fires occurring in the growing season. This system supports populations of associated rare species, including the Jackson prairie crayfish, American kestrel, Ashe’s Hawthorne, great-plains ladies tresses, and Oglethorpe oak.

Jackson Prairie and Woodland Management Strategy

The most important aspect for continued survival of prairie species is that all prairie soils are restored to and maintained in an open prairie condition. Since the soils are limited in occurrence, new prairie soil sites cannot be created; however, existing sites can be restored through removal of canopy species and return of appropriate fire regimes. Program strategies should emphasize removal of non-native invasive species, closure of roads occurring within the system, and improving fire regimes. Retention of native hardwood species such as nutmeg hickory, Durand oak, and post oak should be considered where appropriate. Reintroduction of prairie species may be necessary but should only be considered as a last resort if species are not naturally repopulating the prairie. Program strategy supports the development of rapid assessment protocols to ensure protection and sustainability of the system.

Jackson Prairie and Woodland Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 20. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 20. Jackson prairie and woodland key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Paved Open Road Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Total Road and Trail Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Gated Road Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Open Road Density	>1.5	0.9-1.5	0.4-0.8	<0.4
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<75	75-89	90-94	>95
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90

G.2.18 Ephemeral ponds and emergent wetlands

Ephemeral ponds and emergent wetlands Ecological System Characteristics

Ephemeral ponds and emergent wetlands are dispersed throughout other ecological systems on the National Forests in Mississippi and are limited in scope. Characteristics important to sustaining this ecological niche include protection of hydrologic function, fire regime, structure of the surrounding forest matrix, and protection from human disturbance.

Ephemeral ponds and emergent wetlands Desired Ecological Condition

Ephemeral ponds and emergent wetlands are dispersed across the landscape. They are characterized by soils that are semi-permanently to permanently saturated as a result of groundwater seepage, perched water tables, rainfall, or beaver activity. Wetland-associated species such as panic-grasses, rushes, spikerushes, beak-rushes, meadow beauties and marsh-pinks are present. Hydrologic function remains intact. Ephemeral ponds are present and functioning across the landscape in appropriate sites and provide habitat for a diversity of native species. Naturally fish-free isolated wetlands and ponds exist on the landscape. Freshwater emergent marshes may contain native fish species. Fire naturally occurs in and around this environment, burning through it when water levels are naturally low. This system supports populations of associated species, including the ornate chorus frog, tiger salamander, and the crayfish snake. The most critical example of this habitat is the “Grady” pond which provides breeding habitat for the endangered dusky gopher frog and Mississippi sandhill crane.

Ephemeral ponds and emergent wetlands Management Strategy

Management activities are frequently needed to restore examples which have been ditched or drained and filled. There is a major need for an inventory in order to identify and map remaining and degraded examples needing protection and/or restoration. Program emphasis for this rare community type is on project level inventories to identify extant examples and identify historical examples which are priority candidates for restoration. Projects should incorporate creation of new ponds where appropriate.

Ephemeral ponds and emergent wetlands Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 21. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 21. Ephemeral ponds and emergent wetlands key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Paved Open Road Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Total Road and Trail Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Gated Road Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Open Road Density	>1.5	0.9-1.5	0.4-0.8	<0.4
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90

G.2.19 Cypress Dominated Wetlands

Cypress Dominated Wetlands Ecological System Characteristics

Cypress dominated wetlands are dispersed throughout other ecological systems on the Forests and are limited in scope. Characteristics important to sustaining this ecological system include protection of hydrologic function, relative abundance of this system on the landscape, structure of the surrounding forest matrix, and protection from human disturbance. Restoration of appropriate sites to cypress is a high priority for long-term sustainability of this system.

Cypress Dominated Wetlands Desired Ecological Condition

Mature or old-growth forest or woodland dominates this system, with a varying degree of canopy closure shaped by healthy hydrologic functions and processes. Historical sites on hydric soils are restored to this ecological system. Conditions of the surrounding vegetation types allow distribution and dispersal of cypress dominated wetland obligate species. This system supports populations of associated rare species, including the cypress-knee sedge, swallow-tailed kite, and southeastern myotis.

Cypress Dominated Wetlands Management Strategy

Management activities are frequently needed to restore cypress dominated wetlands where appropriate. Restoration of the hydrologic integrity to prevent drainage is a key component to the management strategy of this system. Program emphasis should be on inventory and mapping on a project basis to document all remaining examples and identify those needing restoration. All examples of this community should be managed for old-growth.

Cypress Dominated Wetlands Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 22. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 22. Cypress dominated wetlands key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-84	85-94	>95
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90

G.2.20 Wet Pine Savanna

Wet Pine Savanna Ecological System Characteristics

Abundance of the wet pine savanna ecological system on the landscape is an important characteristic of this system due to the effects of past land use practices including fire suppression, system drainage, and conversion to other forest types.

Fire regime is a major factor fundamental to long-term sustainability of this ecological system. Many species associated with wet pine savannas are dependent upon fire to maintain open conditions.

Canopy structure is an important characteristic for species diversity and long-term sustainability of this ecological system. Structure in this system has been greatly altered by past land management practices.

Wet Pine Savanna Desired Ecological Condition

This rare wetland system has a scattered canopy (typically 5-10 percent cover) of stunted longleaf pine and slash pine that is shaped by healthy hydrologic functions and processes. Pitcher plants are characteristic of this system. Fire occurs at an interval of 1-3 years with approximately 40 percent of fires occurring in the growing season. This system supports populations of associated uncommon species, including the endangered Mississippi sandhill crane, pitcher plants, and giant spiral ladies'-tresses. Herbaceous seepage bogs and flats are typically embedded within the larger system where site conditions are appropriate.

Table G 23. Wet pine savanna key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Paved Open Road Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Total Road and Trail Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Gated Road Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Open Road Density	>1.5	0.9-1.5	0.4-0.8	<0.4
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<60	60-89	90-94	>95
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90

Wet Pine Savanna Management Strategy

This system as described by desired condition does not currently exist on the National Forests in Mississippi, and the management strategy for this system is to convert 1,000 acres of what is now near coast pine flatwoods to wet pine savanna. Removal of canopy species to create open conditions and restoration of ephemeral ponds will support habitats used by the federally endangered Mississippi Sandhill Crane. Frequent growing season burns will reduce woody vegetation in the understory and promote the herbaceous component which is integral to this system.

Wet Pine Savanna Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 23. These indicators are iterative and can be amended or supplemented as new information becomes available.

G.2.21 Seeps, Springs, and Seepage Swamps

Seeps, Springs, and Seepage Swamps Ecological System Characteristics

Seeps, springs, and seepage swamps are dispersed throughout other ecological systems on the National Forests in Mississippi and are limited in scope. Factors important to sustaining this ecological niche include protection of hydrologic function, fire regime, structure of the surrounding forest matrix, and protection from human disturbance.

Seeps, Springs, and Seepage Swamps Desired Ecological Condition

Mature forest (60 years old or older) comprises approximately 80 percent of system acreage, with 10 percent of mature forest in old-growth. Forests are closed, with canopy closure often greater than 80 percent. In the northern part of the state, this system is a deciduous forest typically characterized by black gum, water tupelo, and red maple, while to the south it grades into an evergreen forest characterized by sweetbay and black gum. Fire creeps into this system from the surrounding upland community; however, seeps, springs and seepage swamps typically only burn during extreme droughty periods. This system is largely undisturbed and hydrologic function is intact.

Seeps, Springs, and Seepage Swamps Management Strategy

Program emphasis should be on inventory and mapping on a project basis to identify all remaining examples and those needing restoration. Seeps, springs, and seepage swamps should be protected from hydrologic degradation and restored to desired conditions where appropriate.

Seeps, Springs, and Seepage Swamps Alternatives and Effects

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 24. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 24. Seeps, springs, and seepage swamps key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Paved Open Road Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Total Road and Trail Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Gated Road Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Open Road Density	>1.5	0.9-1.5	0.4-0.8	<0.4
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90

G.2.22 Herbaceous Seepage Bogs and Flats

Herbaceous Seepage Bogs and Flats Ecological System Characteristics

Abundance of the herbaceous seepage bog and flats ecological system on the landscape is an important characteristic of this system due to the effects of past forest management including fire suppression, system drainage, and conversion to other forest types.

Fire regime is a major factor fundamental to long-term sustainability of this ecological system. Many species associated with it are dependent upon fire to maintain open conditions.

Canopy structure is an important characteristic to species diversity and long-term sustainability of this ecological system. Structure in this system has been greatly altered by past forest management practices.

Herbaceous Seepage Bogs and Flats Desired Ecological Condition

The system is typically open, although the amount of woody vegetation is variable. Hydrologic function of this community is intact. Fire occurs at an interval of 1-3 years with approximately 40 percent of fires occurring in the growing season. A subset of this system known as quaking bogs generally have a higher percentage of woody shrub coverage due to extreme wetness of the system which prevents fire from spreading across the surface except in very dry years. This system supports populations of associated uncommon species, including the Camp Shelby burrowing crayfish, pitcher plants, and the bog spicebush.

Herbaceous Seepage Bogs and Flats Management Strategy

Program emphasis should be on inventory and mapping on a project basis to identify all remaining examples and those areas needing restoration. Known examples of this system should be given priority when applying fire to ensure suitable return intervals and seasonality. The system should be protected from hydrologic disturbance during all project work, including restoration and maintenance. Removal of canopy trees may be necessary to restore open conditions and should be done in accordance with all appropriate guidelines and to foster desired conditions.

Herbaceous Seepage Bogs and Flats Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 25. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 25. Herbaceous seepage bogs and flats key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Paved Open Road Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Total Road and Trail Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Gated Road Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Open Road Density	>1.5	0.9-1.5	0.4-0.8	<0.4
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Persistence of Species Occurrences	Compliance with Species Occurrence Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant

G.3 Species Selection Process

G.3.1 Species Selection Process Introduction

Planning for ecological system sustainability is an iterative process that involves first providing for a diversity of ecosystems across the landscape and then developing additional components to meet the biological needs of specific species or species groups. Management of most plant and animal species will coincide with the management for ecological system sustainability in the forest plan area. However, additional provisions may be needed to provide for specific species.

Ecological system characteristics were evaluated through collaborative development of an ecological sustainability evaluation database, best available science, consideration of data and trends documented in the Analysis of Management Situation, annual monitoring evaluations, and reviews. A similar analysis process was also used to assess species diversity. This report describes the species evaluation process and uses the understanding gained from analysis of ecological system sustainability to develop additional forest plan components for species diversity.

Ecological System Context for Species

Twenty-two native ecological systems were identified for the National Forests in Mississippi using NatureServe's International Ecological Classification Standards (NatureServe 2004a, 2004b). Through coordination with NatureServe, systems were added, removed, or renamed as needed to ensure all conditions on National Forest System land were represented. Each system was defined in terms of existing USDA Forest Service forest types and Natural Resources Conservation Service (NRCS) soil drainage types. Current acreage of each system was determined using Forest Service GIS data. All identified terrestrial and aquatic ecological systems were documented in a relational database referred to as the ecological sustainability evaluation tool, which was based on the structure of the Nature Conservancy planning tool. The ecological sustainability evaluation tool served as the primary process record for ecological sustainability analysis. It included documentation of scientific and other sources consulted, uncertainties encountered, and strategic choices made during development of the database.

Descriptions of ecological conditions that provide for ecological system sustainability were incorporated into forest plan components. These ecological conditions were further analyzed to understand the environmental context and ability for National Forest System (NFS) lands to contribute to the diversity of plant and animal species. The following analysis process was used to determine if further species-specific forest plan components were necessary to sustain species diversity.

Identification and Screening of Species

The National Forests in Mississippi started with a statewide species list compiled from a variety of sources including threatened and endangered, regional forester's sensitive species, Birds of Conservation Concern list, Mississippi Natural Heritage Program plant and animal lists, Mississippi State Comprehensive Wildlife Strategy species of greatest conservation need list, expert panel nominations, and demand species (Figure G 2). The original list consisted of 562 plant and animal species with ranges occurring throughout the state. Input was then sought from a panel of taxonomic experts including biologists from Mississippi Department of Wildlife, Fisheries, and Parks, the US Fish and Wildlife Service, universities in Mississippi, private conservation organizations, and other Forest Service personnel. Discussions included threats, local trends, and whether forest plan components developed for ecosystem diversity were sufficient to conserve the species. Data from these meetings was used during species evaluations and species screenings. Throughout the process, species were both added and delete as new information became available.

Sections G.6 and G.7 list the species which were removed from consideration because they did not occur or have potential to occur on NFS land based upon suitable habitat, range, or expert taxonomic consensus. If these species are found to occur on the Forests, they will be re-considered and carried through the evaluation process.

The remaining species were classified into the following three categories: threatened and endangered, regional forester's sensitive species, and locally rare species. The process for categorizing threatened and endangered species was based on lists maintained under the Endangered Species Act. Potential regional forester's sensitive species included plant and animal species on the region 8 sensitive species lists, those species with a Rounded Global Rank less than or equal to G3, and/or sub specific taxa with a TRANK

less than or equal to T3. Inclusion as locally rare species was based on recommendation of a panel of experts and included species not categorized as regional forester's sensitive species or threatened and endangered with a State Rank (SRANK) less than or equal to S3. These species may be common elsewhere in their range but are rare on the periphery resulting in concerns with genetic diversity of the species. For a full explanation of the species ranking system, please see the Natureserve website at http://www.natureserve.org/explorer/ranking.htm (11/16/2012).

Some species were identified as demand species. There are no population viability concerns for demand species, but the economic and /or recreational value of these species to the public make them an important component of some ecological diversity systems; therefore these species are included in appropriate ecosystem diversity analyses.

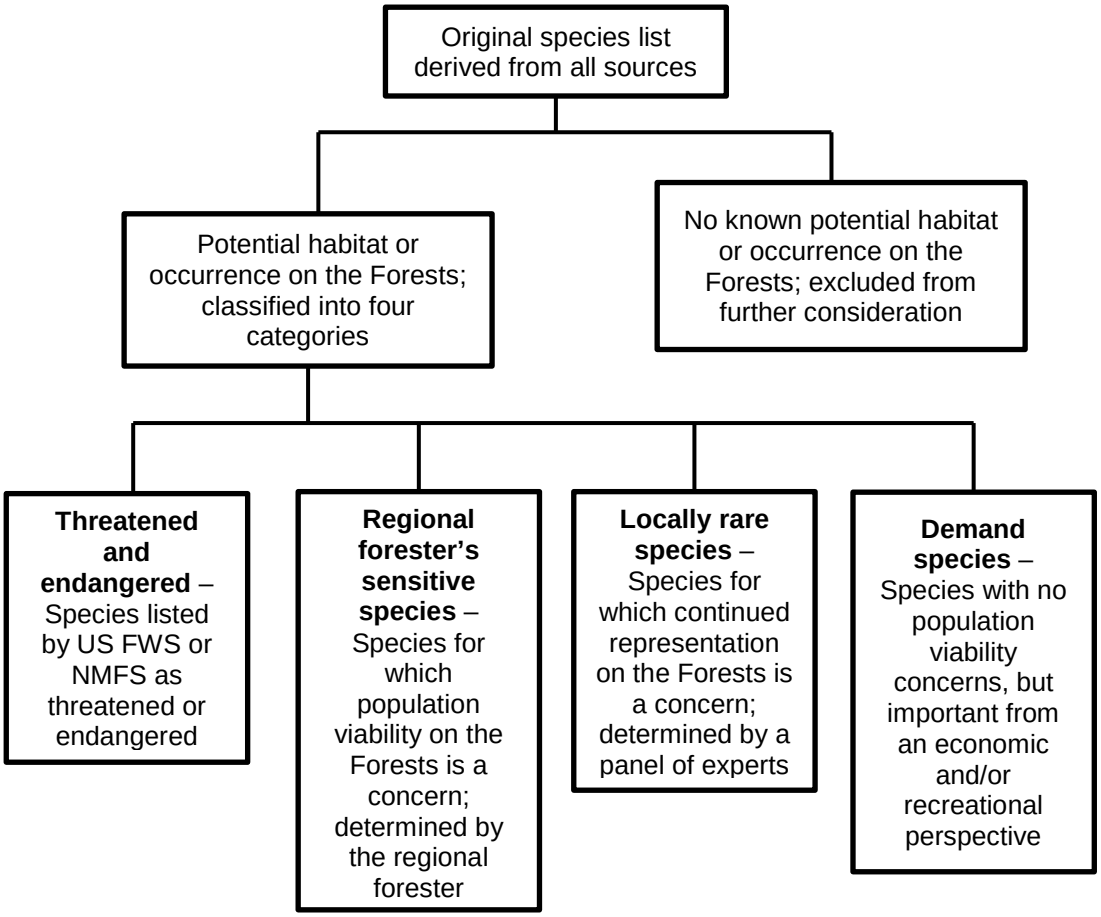
Original species list derived from all sources
Potential habitat or occurrence on the Forests; classified into four categories
No known potential habitat or occurrence on the Forests; excluded from further consideration
Threatened and endangered – Species listed by US FWS or NMFS as threatened or endangered
Regional forester's sensitive species – Species for which population viability on the Forests is a concern; determined by the regional forester
Locally rare species – Species for which continued representation on the Forests is a concern; determined by a panel of experts
Demand species – Species with no population viability concerns, but important from an economic and/or recreational perspective

Figure G 2. Species screening and selection process overview

Species Methodology

Species sustainability and habitat condition scores were derived using the most current science, literature and expert opinion best reflecting natural processes at work within the natural diversity of plant and animal communities and best supporting the viability of associated species and their habitat needs. The effects of each alternative were analyzed using the ecological sustainability evaluation model in terms of sustainability scores of the species which were determined as a reflection of the condition scores of the combined associated species groups and habitat scores, as well as weighted by how important that the

associated group is to that species (very high, high, moderate, low). Ranges and definitions of species ecological sustainability evaluation scores are shown in Table G 26.

Table G 26. Ecological sustainability evaluation score ranges and definitions

Range of Condition Score	Condition	Definition of ecological sustainability evaluation Score Applied To Planning Elements
3.51 - 4.0	Very Good	Habitat and/or population conditions are optimal; species populations should remain robust and potentially even expand.
2.51 - 3.50	Good	Habitat and/or population conditions are acceptable; species populations should remain stable.
1.51 - 2.50	Fair	Habitat and/or population conditions are slightly inadequate; although species populations may persist for some time, they may be subject to gradual decline.
1.00 - 1.50	Poor	Habitat and/or population conditions are severely inadequate; species populations are expected to severely decline; localized extirpations are occurring or are imminent.

G.3.2 Threatened and Endangered Species

This section covers threatened and endangered species which management actions may be necessary to protect species under the Endangered Species Act (36 CFR 219.16). Ecological conditions that are needed to conserve threatened and endangered species are provided by the forest plan components for ecosystem diversity.

Threatened and Endangered Species List

The list of threatened and endangered species in Mississippi is maintained by the US Fish and Wildlife Service and can be found at: http://ecos.fws.gov/tess_public/StateListing.do?state=MS&status=listed

Developing the Forests list of threatened and endangered species was completed cooperatively with the US Fish and Wildlife Service. Some categories of occurrence raised questions about which species should and should not be retained on the list. The following direction provided the Forests the means to determine which species would remain on the list:

If an occurrence is thought to be an “accidental”, i.e., an occurrence of a species well outside its normal range, then consideration of the species in the forest plan revision process may not be warranted as determined by the responsible official. However, only if there is general consensus about the accidental nature of the occurrence.

In some situations, a threatened and endangered species occurred on the forest historically but there are no current occurrences. In this case, for a species which has been absent from a forest for a long period of time, and there is no expectation that it would be reestablished, consideration of the species in the forest plan revision process may not be warranted.

Both of these circumstances occurred with threatened and endangered species on the Forests. Forty-five threatened and endangered plant and animal species with ranges occurring throughout the state were included and evaluated in the ecological sustainability evaluation process. Thirty-six species were removed from our list (section G.7) because they did not occur or have potential to occur on National Forest System land based upon suitable habitat, range, or expert taxonomic consensus (FSH 1909.12, Chap. 40, Sec. 43.22d). If these species are found to occur on the National Forests in Mississippi, they

will be re-evaluated and carried through the evaluation process. Nine threatened and endangered species remained and were further evaluated in the ecological sustainability evaluation process (Table G 27).

Table G 27. Federally listed threatened and endangered species included in the forest plan revision process

Taxa	Species	District Most Likely to Occur	Status
Amphibian	Dusky Gopher Frog (*Rana sevosa*)	De Soto	Endangered
Bird	Mississippi Sandhill Crane (*Grus canadensis pulla*)	De Soto	Endangered
Bird	Red-cockaded Woodpecker (*Picoides borealis*)	Bienville Chickasawhay De Soto Homochitto	Endangered
Fish	Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)	Bienville Chickasawhay De Soto	Threatened
Fish	Pallid Sturgeon (*Scaphirhynchus albus*)	Delta	Endangered
Mammal	Louisiana Black Bear (*Ursus americanus luteolus*)	Chickasawhay, Delta, De Soto, Homochitto	Threatened
Reptile	Gopher Tortoise (*Gopherus polyphemus*)	Chickasawhay De Soto	Threatened
Vascular Plant	Louisiana Quillwort (*Isoetes louisianensis*)	Chickasawhay De Soto	Endangered
Vascular Plant	Pondberry (*Lindera melissifolia*)	Delta	Endangered
Mammal	Indiana Bat *(Myotis sodalis)*	Holly Springs	Endangered

Threatened and Endangered Species Forest Plan Components

Throughout the National Forests in Mississippi, threatened and endangered species protection and threatened and endangered habitat enhancement is a priority, so their needs are particularly emphasized. Many of the forest plan components developed integrates multiple resource areas or systems for the National Forests in Mississippi to maintain or improve threatened and endangered species habitat and/or distribution in order to protect and conserve these species. Other forest plan components are more specific to species needs and management. Habitats for all threatened and endangered species are provided through forestwide emphasis in management prescriptions in associated forest communities and in compliance with US Fish and Wildlife Service recovery plans and the Forests implementation guides.

Desired conditions in land management planning reflect a broad vision that characterizes the desired outcome of land management. In some cases the desired conditions already exist, and our intent is to maintain them. In other cases they may be achievable in the relatively near future or may only be achievable over a long period of time. Desired conditions for threatened and endangered species for the National Forests in Mississippi will be included in the ecosystem diversity and species diversity sections of the forest plan.

Objectives for maintaining species diversity for the national forests in Mississippi will be included in the forest plan. Restoration, maintenance, and enhancement of all ecological systems generally provides for a diverse and sustainable population of species throughout the Forest. Species objectives for some threatened and endangered species are located within their respective ecological system while others require additional objectives to ensure their long-term sustainability.

Guidelines are the sideboards that frame our management activities on the Forest. They ensure the protection of resources as we implement projects that move toward the desired conditions. Some guidelines in the forest plan (chapter 4) will be specific to threatened and endangered species while most encompass needs and protections of threatened and endangered species along with other species and their associated ecosystems found on the Forests.

Regional Forester's Sensitive Species

regional forester's sensitive species are defined as "plant and animal species identified by the regional forester for which population viability is a concern as evidenced by: (a) significant current or predicted downward trends in population numbers or density, and/or (b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution." (FSM 2670.5).

Regional Forester's Sensitive Species list

Regional foresters identify regional forester's sensitive species occurring in a region by examining up-to-date sources of information pertaining to the population status and viability as well as habitat conditions and threats to species. These sources include the US Fish and Wildlife Service and National Marine Fisheries Service candidates for federal listing and state lists of endangered, threatened, rare, endemic, unique, or vanishing species in the region, especially those listed as threatened under state law.

Regional forester's sensitive species are managed to ensure their population viability and preclude a trend towards Federal listing. Prior to any action, there must be an analysis of effects on regional forester's sensitive species populations and population viability, as well as regional forester's sensitive species habitat. Population viability objectives must be established when making decisions that would significantly reduce sensitive species numbers. Section G.8 lists the regional forester's sensitive species analyzed in the ecological sustainability evaluation process.

Regional forester's sensitive species requiring additional forest plan components

Specific forest plan components were developed for certain regional forester's sensitive species in which the ecological system sustainability components did not sufficiently address the needs of the species or there was desire to have additional forest plan direction for the species. These groups consist of species that may have a very limited distribution, have declining populations, are potentially impacted by management activities, or for which additional forest plan direction is desired and we have adequate information about their life histories and habitats. Species groupings were used to identify commonly shared conservation needs and develop appropriate forest plan provisions. Additionally, species were grouped by their threats and limiting factors where possible. As a result, some species required multiple groups to cover their needs.

Locally Rare Species

Locally rare species are species for which population viability and/or continued existence on the National Forests in Mississippi are a concern. Unlike the previous two categories, these species are considered to be at no risk of imperilment at a range wide scale. Forest plan components may or may not be necessary to achieve management goals for these species.

Locally Rare Species List

All species identified as of management concern during meetings with taxonomic experts that were not classified as threatened, endangered or sensitive species were considered eligible for consideration as locally rare species. The potential locally rare species list for the Forests included species that were known to exist or have habitat on NFS lands. Using data collected from meetings with taxonomic experts and the species screening process, some species were then eliminated from further consideration according to the following criteria:

- Species secure in the forest plan area based on knowledge of its occurrence, distribution, availability of habitat, and responses to any management of natural disturbances that might occur.
- Species not affected by any current or potential form of management or lack of management in the planning area.
- Species for which there is too little information known to complete a reliable assessment. In these cases, the lack of critical information should be disclosed and actions towards acquiring that information should be highlighted.
- Species with suitable habitat, but no confirmed occurrence on the Forests (these species will be re-evaluated if found to occur on the National Forests in Mississippi).
- Species state rank is S3 or above.
- Species designation in SWG Forest plan is Tier 3 or below (http://www.natureserve.org/explorer/ranking.htm 11/16/2012).

Species that met these screening criteria were eliminated from further detailed consideration in the planning process. Documentation of this step was essential and reasons for eliminating species based upon taxonomic expert panel consensus were recorded in detail in our ecological sustainability evaluation tool. Potential locally rare species will be reviewed periodically for changes in status or when new information is available, and these species will be re-evaluated if warranted.

The locally rare species remaining for further consideration were screened again to determine whether ecosystem diversity forest plan components fully covered their sustainability needs or if they required development of additional forest plan components to support species sustainability. Section G.9 lists the locally rare species analyzed in the ecological sustainability evaluation process.

Locally rare species requiring additional forest plan components

Specific forest plan components will be developed for some locally rare species. For these species, the ecosystem diversity components did not adequately address the needs of the species or there was a desire to have additional forest plan direction for the species and they were combined into groups. These groups include species that may have a very limited distribution, have declining populations, are potentially impacted by management activities, or for which additional forest plan direction is desired and we have adequate information about their life histories and habitats to create forest plan components. Species groupings were used to identify commonly shared conservation needs and develop appropriate forest plan provisions. Additionally, species were grouped by threats and limiting factors where possible; therefore, some species required multiple groups to cover their needs.

G.3.3 Terrestrial Species Groups Covered by Ecological System Sustainability Forest Plan Components

The Forests used species groups as an evaluation and analysis tool to improve planning efficiency and for development of management strategies. Species were grouped according to their habitat needs, limiting factors, threats, and specific habitat elements (snags, den trees, woody debris, etc.). All federally listed

threatened and endangered species are included in species groups because although they have individual species requirements for management, their management is connected with ecosystem and species diversity. Many threatened and endangered, regional forester's sensitive species, locally rare species, and demand species occurred in multiple groups.

Table G 28. Species to group relationship weights

Species to Group Weights	Group Weight Description
Very High	All or nearly all of the species' needs are covered by the needs of this group for at least one phase of this species' life history.
High	A high proportion of the species' needs are covered by the needs of this group for at least one phase of this species' life history.
Moderate	A moderate proportion of the species' needs are covered by the needs of this group for at least one phase of this species' life history.
Low	A low proportion of the species' needs are covered by the needs of this group for at least one phase of this species' life history.

Table G 29. Terrestrial species groups and associated ecological system(s)

Species Group	Associated Ecological System(s) and Other Forest plan Components
Cypress Dominated Wetlands Associates	Cypress Dominated Wetlands, Rare and Wetland Communities
Herbaceous Seepage Bogs and Flats Associates	Herbaceous Seepage Bog and Flats, Rare and Wetland Communities
Mature Mesic Deciduous Forest Associates	Northern Mesic Hardwood Forest, Southern Mesic Slope Forest
Mature Open Pine-Grass Associates	Loblolly Pine Forest Shortleaf Pine-Oak Forest and Woodland, Slash Pine Forest, Upland Longleaf Pine Forest and Woodland
Mature Riparian Forest Associates	Lower Mississippi River Bottomland and Floodplain Forest, Floodplain Forest
Mature Upland Pine-Hardwood Associates	Northern Dry Upland Hardwood Forest, Southern Dry Upland Hardwood Forest
Pine Flatwoods Associates	Near-Coast Pine Flatwoods, Rare and Wetland Communities
Ponds and Emergent Wetlands Associates	Ephemeral Ponds and Emergent Wetlands
Prairie Associates	Black Belt Calcareous Prairie and Woodland, Jackson Prairie and Woodland, Rare Communities
Rock Outcrop Associates	Rock Outcrops
Seeps, Springs, and Seepage Swamps Associates	Seeps, Springs, and Seepage Swamps
Wet Pine Savanna Associates	Wet Pine Savanna, Rare and Wetland Communities
Xeric Sandhill Associates	Xeric Sandhills

Initial groupings of species were at a broad spatial scale and were based on similar habitats associated with ecological systems. Each group was analyzed by species, and determinations made on whether species needs were fully met by forest plan components for the associated ecological systems. These groups and the ecological system(s) with which they are associated are listed in Table G 29. Species to group relationships were weighted from very high to low with higher ratings indicative of indispensable relationships between species and the habitat attributes targeted by a given group (Table G 28).

Cypress Dominated Wetlands Associates

These species are generally associated with swamps that are dominated by cypress and require intact hydrologic function of this system. A list of targeted species associated with this species group can be found in Table G 30. Of the listed species, only the cypress-knee sedge is dependent on the presence of cypress trees. Headcutting is threatening hydrologic integrity of two of the better known examples on the National Forests in Mississippi (Holly Springs and Homochitto NFs). It is assumed that sustainable populations will continue as long as there is permanently flooded cypress-gum forest with hydrologic integrity. Headcutting or other events leading to drainage and sedimentation from adjacent uplands may prevent management for sustainable populations of these species, and rapid assessment protocols should be designed to measure sustainability of cypress dominated wetland associates. Relative abundance of cypress dominated wetland ecological systems and restoration and maintenance of hydrologic integrity are key characteristics for this species group. Planting of cypress may be necessary to restore some of these sites. Forest plan components include desired conditions for cypress dominated wetlands and guidelines for vegetation/wildlife; soil and water; roads; herbicides; and administration, facilities, and recreation.

Table G 30. Species in cypress dominated wetlands associates

Species Name	Common Name	Species-to-Group Weight
Aix sponsa	Wood Duck	Moderate
Anas platyrhynchos	Northern Mallard	Moderate
Anas rubripes	American Black Duck	Moderate
Carex decomposita	Cypress-knee Sedge	Very High
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	High
Hemidactylium scutatum	Four-toed Salamander	Moderate
Myotis austroriparius	Southeastern Myotis	High
Elanoides forficatus	Swallow-Tailed Kite	High
Myotis sodalis	Indiana Bat	High

Depending on past history of disturbance and other factors, bald cypress may occur with other species such as black gum, water tupelo, green ash, ironwood and red maple. Cypress dominated wetlands may be found throughout the Forests, but due to inconsistencies in past mapping practices there is no current accurate estimate of the amount of acreage in this type. Current condition of this type on the forest is probably relatively young forest growing back from harvest in the early part of this century. Several key locations are at risk due to headcutting of streams threatening to drain the wetland, while other locations have been harvested without successful cypress regeneration and await restoration.

The desired condition for species in this group is occurrence within a mature or old-growth forest or woodland dominated by this system, with a varying degree of canopy closure shaped by healthy hydrologic functions and processes. Historical sites on hydric soils are restored to this ecological system. Conditions of the surrounding vegetation types allow distribution and dispersal of cypress dominated wetland obligate species.

Management activities are frequently needed to restore cypress dominated wetlands where appropriate. Restoration of the hydrologic integrity to prevent drainage is a key component to the management strategy of this system. Program emphasis should be on inventory and mapping on a project basis to

document all remaining examples and identify those needing restoration. All examples of this community should be managed as old-growth.

Using the ecological sustainability evaluation process, key attributes and indicator metrics were identified as described in Table G 31. These attributes and indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 31. Cypress dominated wetlands associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Distance from Roads	ORV Trail Density	Very High
Distance from Roads	Paved Open Road Density	Moderate
Distance from Roads	Total Road and Trail Density	High
Distance from Roads	Unpaved Gated Road Density	Moderate
Distance from Roads	Unpaved Open Road Density	Moderate
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Very High
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Forest Age Diversity	% Mature Forest	Very High
Forest Age Diversity	% Old Forest	Very High
Vegetation Structure	% Old-growth	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
Invasive Species Abundance	Percent of Invasive Species Occupying System	Very High
Ecological System Abundance at Desired Condition	Compliance with Rare Ecological System / Rare Community Guidelines	Very High

Herbaceous Seepage Bogs and Flats Associates

Herbaceous seepage bogs and flats are rare communities and provide unique habitats for many species. A list of targeted species associated with this species group can be found in Table G 32. Various species of pitcher-plants are often dominant in these areas. Inventory and mapping of herbaceous seepage bogs are important to help understand and manage these species. It is assumed that sustainable populations of the associated species will continue in conjunction with maintenance of hydrologic regime, regular prescribed burning, and protection from human disturbance (vehicular and foot traffic). Some of these areas have grown up in woody vegetation and may require mechanical clearing. Although guidelines generally prohibit management activities within rare communities, exceptions can be made for restoration of the system. When management activities occur within a rare community, the species associated with it should be considered at the project level.

The key attributes and indicators for this group can be tied directly back to the ecological system herbaceous seepage bogs and flats (Table G 33). Rapid assessment protocols which measure effects of fire, hydrologic integrity, species composition, human disturbance, structure, and relative abundance are important to monitoring long-term sustainability of this community and its associated species. Planning components include desired conditions and objectives for the ecological system herbaceous seepage bogs and flats, desired conditions for species diversity, and guidelines for vegetation/wildlife; soil and water; roads; herbicides; and administration, facilities, and recreation.

Table G 32. Species in herbaceous seepage bogs and flats associates

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Very High
Agalinis filicaulis	Thin Stemmed False-foxglove	Very High
Agalinis pseudaphylla	Shinner's False-foxglove	High
Aristida simpliciflora	Southern Three-awned Grass	Very High
Calopogon barbatus	Bearded Grass-pink	Very High
Carex exilis	Coast Sedge	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Very High
Eriocaulon texense	Texas Pipewort	Very High
Fallicambarus danielae	Speckled Burrowing Crayfish	High
Fallicambarus gordoni	Camp Shelby Burrowing Crayfish	Very High
Gaylussacia frondosa	Dangleberry	High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lindera subcoriacea	Bog Spicebush	Very High
Linum macrocarpum	Spring Hill flax	Very High
Macranthera flammea	Flame Flower	High
Panicum nudicaule	Naked-stemmed Panic Grass	Very High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Peltandra sagittifolia	White Arum	Moderate
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Polygala hookeri	Hooker's Milkwort	Very High
Procambarus fitzpatricki	Spiny-tailed Crayfish	High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	Very High
Rhynchospora macra	Large Beakrush	Very High
Rhynchospora stenophylla	Chapman Beakrush	Very High
Ruellia noctiflora	Night Flowering Ruellia	Very High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	Very High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High
Stylisma aquatica	Water Southern Morning-glory	Moderate
Syngonanthus flavidulus	Yellow Pipewort	Moderate
Utricularia olivacea	Piedmont Bladderwort	Moderate
Utricularia purpurea	Purple Bladderwort	Moderate
Xyris drummondii	Drummond's Yellow-eyed Grass	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Table G 33. Herbaceous seepage bogs and flats associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
	Percent of System Acres Burned During the Growing Season	Very High
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	Moderate
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Low
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Vegetation Structure	% Open	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	High
Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
	Road Crossings Rating	Very High
Indicator Species Status	Population Trend of yellow trumpets (*Sarracenia alata* Alph. Wood)	High
Ecological System Abundance at Desired Condition	Compliance with Rare Ecological System / Rare Community Guidelines	Very High
Persistence of Species Occurrences	Compliance with Species Occurrence Guidelines	Very High
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Very High

Mature Mesic Deciduous Forest Associates

Mature mesic deciduous forest communities are located on cool north-facing slopes with rich soils and thick layers of fertile leaf litter. They can be considered to be patches within a matrix of more xeric forest types. Each patch is only a small portion of the overall landscape and is generally removed from other mesic deciduous forest by over 100m or more. A list of targeted species associated with this species group can be found in Table G 34. Species dependent upon this forest type generally require closed canopy forest with moist organic soils and thick leaf litter. Abundance of mast-producing trees provides food for many species and downed wood, snags, and other refuge are a key requirement within this group Table G 35. Species should remain sustainable if a mature, closed canopy mesic deciduous forest is maintained on the landscape and appropriate guidelines are followed. It is important that only low intensity fire creep into these areas to maintain the duff/ organic layer.

The key characteristics and performance measures for this group are the same as for the ecological systems southern mesic slope forest, southern loess bluff forest, and northern mesic hardwood forest. The key factors for increasing relative abundance are retention of existing mature examples of these systems and restoration through conversion of off-site pine species. Forestwide desired conditions as well as desired conditions for both mesic forest ecological system and species diversity serve as forest plan components for these species.

Table G 34. Species in mature mesic deciduous forest associates

Species Name	Common Name	Species-to-Group Weight
Antennaria solitaria	Single-headed Pussytoes	High
Aralia racemosa	American Spikenard	High
Asarum canadense	Canada Wild-ginger	Very High
Carex impressinervia	Ravine Sedge	Very High
Carex picta	Painted Sedge	Moderate
Celastrus scandens	Climbing Bittersweet	Moderate
Cornus alternifolia	Alternate-leaf Dogwood	High
Cypripedium parviflorum	Small Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High
Desmodium ochroleucum	Cream Tick-trefoil	Moderate
Echinacea purpurea	Eastern Purple Coneflower	Moderate
Erythronium albidum	White Dog's Tooth Violet	Very High
Euonymus atropurpureus	Burning Bush	Moderate
Frasera caroliniensis	American Colombo	Moderate
Galearis spectabilis	Showy Orchis	Very High
Goodyera pubescens	Downy Rattlesnake-plantain	Very High
Hexalectris spicata	Crested Coralroot	Very High
Juglans cinerea	Butternut	Very High
Lycopodium digitatum = flabelliforme	Fan Club Moss	Moderate
Matelea obliqua	Climbing Milkweed	High
Pachysandra procumbens	Allegheny-spurge	Very High
Panax quinquefolius	American Ginseng	Very High
Physalis carpenteri	Carpenter's Ground-cherry	Very High
Plethodon websteri	Webster's Salamander	Very High
Polemonium reptans	Jacob's Ladder	Very High
Polytaenia nuttallii	Prairie Parsley	Low
Salvia urticifolia	Nettle-leaf Sage	Moderate
Schisandra glabra	Bay Starvine	Very High
Silene ovata	Ovate Catchfly	Moderate
Solidago auriculata	Eared Goldenrod	Very High
Solidago flaccidifolia	Appalachian Goldenrod	High
Trillium foetidissimum	Fetid Trillium	High
Triphora trianthophora	Three Birds Orchid	Very High
Uvularia floridana	Florida Bellwort	High
Myotis sodalis	Indiana Bat	High

Table G 35. Mature mesic deciduous forest associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	High
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Low
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Moderate
	Percent of System Acres Burned During the Growing Season	Moderate
Forest Age Diversity	% Mature Forest	High
	% Old Forest	High
	% Regenerating Forest	High
Habitat Element Abundance	Compliance with Bat Roost Structure Guidelines	Low
	Compliance with Den Tree Guidelines	Very High
	Compliance with Downed Wood Guidelines	Very High
	Compliance with Hard Mast Guidelines	Very High
	Compliance with Snag Guidelines	Very High
	Compliance with Stump and Stump-hole Guidelines	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	High
Understory Composition	Compliance with Understory Composition Guidelines	Very High
Vegetation Structure	% Mature Very-Closed Canopy	Very High
	% Old-growth	High

Mature Open Pine-Grass Associates

Mature upland pine forests and woodlands support a diversity of species and provide critical habitat for several rare and endangered species. A list of targeted species associated with this species group can be found in Table G 36. Pine-grass associated species are dependent on mature open canopy, fire-maintained forests or woodlands across multiple ecosystem types. Frequent fire is critical to maintaining these systems, and in the absence of fire, chemical or mechanical means may be needed to maintain the herbaceous grass/forb layer. Abundant, diverse ground cover provides food and shelter for a variety of wildlife species. By providing for healthy and abundant upland pine forests, species in this group should continue to thrive on the National Forests in Mississippi.

Table G 36. Species in mature open pine-grass associates

Species Name	Common Name	Species-to-Group Weight
Agalinis pseudaphylla	Shinner's False-foxglove	Moderate
Aimophila aestivalis	Bachman's Sparrow	Very High
Ammodramus henslowii	Henslow's Sparrow	Moderate
Botrychium jenmanii	Dixie Grapefern	High
Colinus virginianus	Northern Bobwhite	Very High
Crotalus adamanteus	Eastern Diamondback Rattlesnake	High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Moderate
Falco sparverius paulus	Southeastern American Kestrel	Very High
Gopherus polyphemus	Gopher Tortoise	Very High
Heterodon simus	Southern Hognose Snake	Very High
Lobelia appendiculata	Appendaged Lobelia	High
Marshallia graminifolia var. cynanthera	Broadleaf Barbara's Buttons	Low
Ophisaurus mimicus	Mimic Glass Lizard	Very High
Picoides borealis	Red-cockaded Woodpecker	Very High
Pituophis melanoleucus lodingi	Black Pine Snake	Very High
Polygala leptostachys	Slender Spike Milkwort	Moderate
Pycnanthemum muticum	Blunt Mountainmint	Moderate
Rana sevosa	Dusky Gopher Frog	Very High
Rhadinaea flavilata	Pine Woods Snake	Moderate
Myotis sodalis	Indiana Bat	Low

The key attributes and indicator metrics for this group are the same as for the ecological systems upland longleaf pine forest and woodland, shortleaf pine-oak forest and woodland, loblolly pine forest, and slash pine forest (Table G 37). Relative abundance of mature upland pine forests as well as canopy structure, fire regime, and the resulting herbaceous groundcover are the most important factors in sustaining this species group. Forestwide desired conditions as well as desired conditions for each upland pine ecological system serve as forest plan components for these species. Objectives are to restore or maintain mature open canopy pine forests with appropriate fire regimes help to sustain these species, along with guidelines for vegetation/wildlife and fire.

Table G 37. Mature open pine-grass associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	High
	Total Road and Trail Density	Very High
	Unpaved Gated Road Density	Low
	Unpaved Open Road Density	High
Ecological System Abundance at Desired Condition	Percent of Ecological System Acres at Desired Condition	Very High
	Percent of potential acres with Appropriate System	Very High
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
	Percent of System Acres Burned During the Growing Season	Very High
Forest Age Diversity	% Mature Forest	High
	% Old Forest	High
	% Regenerating Forest	Moderate
Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High
	Compliance with Downed Wood Guidelines	Very High
	Compliance with Snag Guidelines	Very High
	Compliance with Stump and Stump-hole Guidelines	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	Very High
Understory Composition	Compliance with Understory Composition Guidelines	High
Vegetation Structure	% Mature Open and Sparse Canopy	Low
	% Mature Open Canopy	Very High
	% Old-growth	Very High
	% Open	Very High
	Compliance with Canopy Cover Sensitivity Guidelines	Very High

Mature Riparian Forest Associates

These species are dependent upon adequate soil moisture and closed canopy deciduous forest in riparian areas. An abundance of mast producing trees and shelter in the form of downed wood, snags, and tree cavities must be available for species occurring within this system. A list of targeted species associated with this species group can be found in Table G 38. It is assumed that sustainable populations will persist if the riparian areas contain a mature, closed canopy forest with little or no unnatural disturbance, and the hydrologic function remains intact.

Table G 38. Species in mature riparian forest associates

Species Name	Common Name	Species-to-Group Weight
Aix sponsa	Wood Duck	Very High
Alisma subcordatum	Broad-leaved Water-platain	High
Chamaecyparis thyoides	Atlantic White Cedar	Very High
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Very High
Elanoides forficatus	Swallow-tailed Kite	Very High
Epidendrum magnoliae = conopseum	Green-fly Orchid	High
Goodyera pubescens	Downy Rattlesnake-plantain	Moderate
Haliaeetus leucocephalus	Bald Eagle	Moderate
Isoetes louisianensis	Louisiana Quillwort	High
Isoetes melanopoda	Blackfoot Quillwort	High
Lasiurus intermedius	Northern Yellow Bat	Very High
Limnothlypis swainsonii	Swainson's Warbler	High
Lindera melissifolia	Pondberry	Very High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Low
Mimulus ringens	Square-stem Monkey Flower	High
Myotis austroriparius	Southeastern Myotis	Very High
Penstemon tenuis	Sharp-sepal Beardtongue	High
Platanthera peramoena	Purple Fringeless Orchid	Moderate
Polytaenia nuttallii	Prairie Parsley	Low
Pycnanthemum muticum	Blunt Mountainmint	Moderate
Quercus oglethorpensis	Oglethorpe Oak	High
Rhynchospora crinipes	Hairy Peduncled Beakrush	Very High
Schisandra glabra	Bay Starvine	Moderate
Trillium foetidissimum	Fetid Trillium	High
Triphora trianthophora	Three Birds Orchid	High
Ursus americanus	Black Bear	High
Ursus americanus luteolus	Louisiana Black Bear	High
Uvularia floridana	Florida Bellwort	High
Myotis sodalis	Indiana Bat	Very High

The key characteristics and performance measures for this group are the same as for the ecological systems floodplain forest and lower Mississippi River bottomland and floodplain forest (Table G 39). The key factor relative abundance represents retention of existing mature examples and restoration involving conversion of off-site pine species to mature riparian forest gradually over time. Forestwide desired conditions as well as desired conditions for each floodplain ecological system and species diversity serve as forest plan components for these species. Objectives to restore or maintain floodplain forest will help to sustain these species, along with guidelines for vegetation/wildlife and soil and water.

Table G 39. Mature riparian forest associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	Very High
	Total Road and Trail Density	Very High
	Unpaved Gated Road Density	Moderate
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Forest Age Diversity	% Mature Forest	Moderate
	% Old Forest	High
Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High
	Compliance with Downed Wood Guidelines	Very High
	Compliance with Hard Mast Guidelines	Very High
	Compliance with Snag Guidelines	Very High
Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
	Road Crossings Rating	High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	Moderate
Vegetation Structure	% Mature Very-Closed Canopy	Moderate
	Compliance with Canopy Cover Sensitivity Guidelines	High

Mature Upland Pine-Hardwood Associates

These species are associated with xeric stands of hardwood although pine may be intermingled with the oaks. A list of targeted species associated with this species group can be found in Table G 40. These forests occur on sandy, porous, nutrient-poor soils typically found on southern and western slopes or on hilltops dominated by oaks and hickories. The irregular canopy creates openings for sunlight to penetrate to the forest floor, where a variety of saplings develop, opening the way for succession. Oak leaves are low in nutrients, high in acid and slow to decay. Oaks stump-sprout following a fire further perpetuating their species. Shrub diversity is highly variable throughout this extensive landscape area, providing a variety of food sources and habitat for animal species. The ground layer under this relatively sunny canopy tends to bloom in mid-summer. Some of the native flowers that occur in this community include orchids, rattlesnake plantain, smooth bedstraw, wild geranium, and false Solomon's seal.

Table G 40. Species in mature upland pine-hardwood associates

Species Name	Common Name	Species-to-Group Weight
Arabis canadensis	Sicklepod	Moderate
Carex picta	Painted Sedge	Moderate
Colinus virginianus	Northern Bobwhite	Low
Crataegus triflora	Three-flower Hawthorn	Moderate
Cypripedium pubescens	Yellow Lady's-slipper	Moderate
Desmodium ochroleucum	Cream Tick-trefoil	Moderate
Echinacea purpurea	Eastern Purple Coneflower	Low
Frasera caroliniensis	American Colombo	Low
Hamemalis ovalis	Big-leaf witch-hazel	High
Hexalectris spicata	Crested Coralroot	Moderate
Lycopodium digitatum = flabelliforme	Fan Club Moss	High
Ponthieva racemosa	Shadow-witch Orchid	Low
Prenanthes aspera	Rough Rattlesnake-root	Low
Quercus oglethorpensis	Oglethorpe Oak	Moderate
Rhadinaea flavilata	Pine Woods Snake	High
Salvia urticifolia	Nettle-leaf Sage	High
Silene ovata	Ovate Catchfly	High
Solidago flaccidifolia	Appalachian Goldenrod	Moderate
Triphora trianthophora	Three Birds Orchid	Low
Uvularia floridana	Florida Bellwort	Low

The key attributes and indicator metrics for this group are the same as for the ecological systems northern dry upland hardwood forest and southern dry upland forest (Table G 41). Forestwide desired conditions as well as desired conditions for each upland ecological system and species diversity serve as forest plan components for these species. Objectives to restore or maintain upland hardwood forest help to sustain these species, along with guidelines for vegetation/wildlife.

Table G 41. Mature upland pine-hardwood associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Distance from Roads	ORV Trail Density	High
	Paved Open Road Density	High
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Moderate
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	% potential acres with Appropriate System	Very High
Fire Regime	% System Acres Burned at Desired Return Interval	Moderate
	% System Acres Burned During the Growing Season	Moderate
Forest Age Diversity	% Mature Forest	High
	% Old Forest	High
	% Regenerating Forest	Moderate
Habitat Element Abundance	Compliance with Bat Roost Structure Guidelines	Very High
	Compliance with Den Tree Guidelines	Very High
	Compliance with Downed Wood Guidelines	Very High
	Compliance with Hard Mast Guidelines	Very High
	Compliance with Snag Guidelines	Very High
	Compliance with Stump and Stump-hole Guidelines	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	High
Vegetation Structure	% Mature Closed Canopy	High

Pine Flatwoods Associates

Species in this group inhabit sparse woodlands dominated by longleaf and slash pine with scattered loblolly pine, located predominately on non-riverine hydric soil site types. A list of targeted species associated with this species group can be found in Table G 42. Fire is necessary to maintain this habitat as well as intact hydrologic regimes. Past agricultural practices have altered the habitat and efforts should be made to restore it to its original form. Management activities are frequently needed to restore near-coast pine flatwood forests, historical fire regimes, and characteristic grass-forb understories.

Table G 42. Species in pine flatwoods associates

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Moderate
Agalinis filicaulis	Thin Stemmed False-foxglove	Moderate
Calopogon barbatus	Bearded Grass-pink	Moderate
Cirsium lecontei	LeConte's Thistle	Moderate
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Moderate
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Moderate
Hemidactylium scutatum	Four-toed Salamander	Low
Isoetes louisianensis	Louisiana Quillwort	High
Isoetes valida	Strong Quillwort	Moderate
Lachnocaulon digynum	Pineland Bogbutton	Moderate
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Moderate
Macranthera flammea	Flame Flower	High
Polygala hookeri	Hooker's Milkwort	Moderate
Polygala leptostachys	Slender Spike Milkwort	Moderate
Procambarus fitzpatricki	Spiny-tailed Crayfish	Moderate
Rhadinaea flavilata	Pine Woods Snake	High
Ruellia noctiflora	Night Flowering Ruellia	Moderate
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	Moderate
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Moderate
Stylisma aquatica	Water Southern Morning-glory	Moderate
Syngonanthus flavidulus	Yellow Pipewort	Moderate
Utricularia olivacea	Piedmont Bladderwort	High
Utricularia purpurea	Purple Bladderwort	High
Xyris drummondii	Drummond's Yellow-eyed Grass	Moderate

The key attributes and indicator metrics for this group are the same as for the ecological system near coast pine flatwoods (Table G 43). Forestwide desired conditions as well as desired conditions for near coast pine flatwoods and species diversity serve as forest plan components for these species. Objectives to restore or maintain pine flatwoods help to sustain these species, along with guidelines for vegetation/wildlife; soil and water; roads; invasive species; herbicides; and administration, facilities, and recreation.

Table G 43. Pine flatwoods associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
	Percent of System Acres Burned During the Growing Season	Very High
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	High
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Moderate
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Forest Age Diversity	Percent of Ecological System Acres in Mid-Aged Trees	High
	% Mature Forest	High
	% Regenerating Forest	Moderate
Vegetation Structure	% Open	High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	Very High
Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High
	Compliance with Downed Wood Guidelines	Very High
	Compliance with Snag Guidelines	Very High
	Compliance with Stump and Stump-hole Guidelines	Very High
Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
Soil Productivity	Compliance with Soil Productivity Guidelines	Moderate
Understory Composition	Compliance with Understory Composition Guidelines	Moderate

Ponds and Emergent Wetlands Associates

The species associated with this wetland system utilize a wide array of seasonally flooded depression wetlands, freshwater marshes, and ephemeral ponds. A list of targeted species associated with this species group can be found in Table G 44. Included here are ponds of various geomorphic origins in a variety of substrates including lime sinks and Grady ponds which may hold areas of shallow open water for significant portions of the year. Many of these have been altered or destroyed as a result of agricultural practices or erosion from disturbance on adjacent uplands. Past management actions in these areas may have resulted in woody plant encroachment and drainage of the wetlands. The few remaining examples are vulnerable to OHV use, ditching and drainage, and invasion by non-native plants and animals. Information on location and size of this community type is not well known or documented.

Since they are of small size and often dry up during the year, they are valuable as breeding sites for amphibians and are invaluable for Mississippi sandhill crane breeding on the De Soto NF. These habitats

are also important for dusky gopher frog breeding and survival. Many of the species in this group thrive in a fishless environment as fish are known predators of larval amphibians. Species in this group generally migrate to ponds and emergent wetlands for breeding and are susceptible to hazards caused by crossing roads. Species in this group are also susceptible to damage caused by trampling and hydrologic modification cause by OHVs or other human disturbance.

Table G 44. Species in ponds and emergent wetlands associates

Species Name	Common Name	Species-to-Group Weight
Alisma subcordatum	Broad-leaved Water-platain	High
Anas platyrhynchos	Northern Mallard	High
Anas rubripes	American Black Duck	High
Elanoides forficatus	Swallow-tailed Kite	Moderate
Eleocharis melanocarpa	Black-fruited Spikerush	High
Eleocharis robbinsii	Robbins Spikerush	High
Eleocharis tricostata	Three-angled Spikerush	High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Macranthera flammea	Flame Flower	High
Mimulus ringens	Square-stem Monkey Flower	High
Myotis sodalis	Indiana Bat	Very High
Myriophyllum laxum	Loose Watermilfoil	Moderate
Nymphoides aquatica	Big Floating Heart	High
Nymphoides cordata	Floating Heart	High
Peltandra sagittifolia	White Arum	High
Polygala hookeri	Hooker's Milkwort	Moderate
Pseudacris ornata	Ornate Chorus Frog	Very High
Rana sevosa	Dusky Gopher Frog	Very High
Sagittaria isoetiformis	Slender Arrow-head	High
Stylisma aquatica	Water Southern Morning-glory	High
Utricularia olivacea	Piedmont Bladderwort	High
Utricularia purpurea	Purple Bladderwort	High

Management activities are frequently needed to restore sites that have been ditched, drained, and/or filled. Program emphasis for ponds and emergent wetlands is on project level inventory to identify extant examples and identify historical examples which are priority candidates for restoration of species composition and community structure to reflect the natural range of variation for this community. Creation of new ponds can help sustain species in this group.

The key attributes and indicator metrics for this group are the same as for the ecological system ephemeral ponds and emergent wetlands (Table G 45). Forestwide desired conditions as well as desired conditions for ponds and emergent wetlands and species diversity serve as forest plan components for these species. Guidelines include vegetation/wildlife; soil and water; roads; invasive species; herbicides; and administration, facilities, and recreation.

Table G 45. Ponds and emergent wetlands associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Moderate
	Percent of System Acres Burned During the Growing Season	Moderate
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	Moderate
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Moderate
	Unpaved Open Road Density	Moderate
Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	High
	Reduction of Fire Ants	Moderate
Hydrologic Function	Road Crossings Rating	High
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Very High

Prairie Associates

These species are associated with two rare ecological systems (Jackson prairie and black belt) and occupy open grassy areas with highly calcareous, high pH soils. The herbaceous and grass species are dominated by characteristic prairie species. A list of targeted species associated with this species group can be found in Table G 46. Known sites are now in woodland or sparsely forested due to past land use practices. Many may show signs of erosion such as gullies. Plant species diversity in these understories has likely been adversely affected by past intensive grazing, and use of the prairie openings as wildlife food plots, roads and log landings. Management activities are frequently needed to restore prairie vegetation, enlarge present openings, and restore damage done by past management actions (remove food plots, log landings, etc.), historical fire regimes. Locations of this rare community should be identified and mapped on the Forests. Rapid assessment protocols should be developed to determine sustainability of these species, and species in this group should be protected from ground disturbance, human disturbance, and habitat loss.

Table G 46. Species in prairie associates

Species Name	Common Name	Species-to-Group Weight
Agalinis auriculata	Earleaf False-foxglove	Very High
Agalinis pseudaphylla	Shinner's False-foxglove	Moderate
Asclepias hirtella	Prairie Milkweed	High
Aster ericoides	White Heath Aster	High
Carex microdonta	Small-Toothed Sedge	High
Carya laciniosa	Big Shellbark Hickory	High
Colinus virginianus	Northern Bobwhite	High
Crataegus harbisonii (=C. ashei)	Ashe Hawthorn	High
Crataegus triflora	Three-flower Hawthorn	High
Desmodium ochroleucum	Cream Tick-trefoil	High
Dodecatheon meadia	Shootingstar	High
Echinacea purpurea	Eastern Purple Coneflower	High
Erythronium albidum	White Dog's Tooth Violet	High
Euonymus atropurpureus	Burning Bush	High
Frasera caroliniensis	American Colombo	Moderate
Hexalectris spicata	Crested Coralroot	High
Juglans cinerea	Butternut	Moderate
Marshallia graminifolia var. cynanthera	Broadleaf Barbara's Buttons	Moderate
Polytaenia nuttallii	Prairie Parsley	High
Ponthieva racemosa	Shadow-witch Orchid	High
Prenanthes aspera	Rough Rattlesnake-root	High
Procambarus barbiger	Jackson Prairie Crayfish	Very High
Quercus oglethorpensis	Oglethorpe Oak	Moderate
Rhamnus lanceolata	Lance-leaved Buckthorn	High
Spiranthes magnicamporum	Great Plains Ladies'-tresses	Very High

The key attributes and indicator metrics for this group are the same as for the ecological systems Jackson prairie and woodland and black belt prairie and woodland (Table G 47). The key factor for this ecological system is relative abundance on the landscape and is a vital step in providing for species sustainability. Forestwide desired conditions as well as desired conditions for prairies and species diversity serve as forest plan components for these species. Objectives to restore or maintain prairies help to sustain these species, along with guidelines for vegetation/wildlife; soil and water; roads; fire; and administration, facilities, and recreation.

Table G 47. Prairie associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
	Percent of System Acres Burned During the Growing Season	Very High
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	Moderate
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Low
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with appropriate system	Very High
Vegetation Structure	% Open	Very High
Indicator Species Status	Population Trend of purple prairie clover (*Dalea purpurea* Vent.)	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	High
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Very High

Rock Outcrop Associates

Rock outcrops are rare, localized features of the landscape which mainly occur along steep hill slopes, ravines, or river channels where soils have eroded away. They are usually embedded in a larger ecological system and rely heavily on surrounding habitats for landscape scale functions and processes. There are an estimated 500 acres of this habitat in the entire state of Mississippi. Distribution on the National Forests in Mississippi is unknown; however, rock outcrops may occur on all Forests except the De Soto Chickasawhay and Delta units. Although of minor aerial extent, the rock outcrops provide unique quality habitat for several species of animals and plants including Webster's salamander and hairy lipfern.

The primary species associated with rock outcrops on the Forests is Webster's salamander. A list of targeted species associated with this species group can be found in Table G 48. Webster's salamander is found in association with this system and is dependent upon it for thermal refuge. Webster's salamanders are not considered fully covered by ecological diversity forest plan components as they have needs in addition to those covered by their associated ecological systems. Many other herpetofaunal and plant species also depend upon this rare habitat as rock outcrops provide thermal refuge and foraging opportunities for associated species. General management strategy for this species group includes completion of inventory and mapping of the ecological system as part of project planning, training on recognition and ecological function of rare ecosystems, and development of rapid assessment criteria. Management activities are frequently needed to restore hardwood overstories and healthy hydrologic regimes such as springs and seeps that often co-occur with rock outcrops. The inclusion of rock outcrops in designated old-growth or botanical areas should be a priority of the Forests.

Table G 48. Species in rock outcrop associates

Species Name	Common Name	Species-to-Group Weight
Plethodon websteri	Webster's Salamander	High
Cheilanthes lanosa	Hairy lipfern	Very High

The key attributes and indicator metrics for this group are the same as for the ecological systems rock outcrops Table G 49. Implementation monitoring and rapid assessment protocols are the tools used to measure sustainability of both the system and its associated species. Desired conditions and guidelines for the ecological system rock outcrops should cover the sustainability of these species, along with guidelines for vegetation/wildlife.

Table G 49. Rock outcrop associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
Invasive Species Abundance	Reduction of Fire Ants	Very High

Seeps, Springs, and Seepage Swamps Associates

Species occurring in this group require forested wetlands in acidic, seepage-influenced habitats. These habitats are usually in deciduous forests or herbaceous communities and are generally found at the base of slopes where seepage flow is concentrated and resulting moisture conditions are saturated or inundated. A list of targeted species associated with this species group can be found in Table G 50. The vegetation is characterized by black gum, tupelo gum, and red maple. Due to excessive wetness, historically these sites have not been as highly disturbed as adjacent upland areas and are protected from fire except during extreme droughty periods. Currently, they are susceptible to damage caused by hydrologic modification, canopy cover reduction, and human disturbance. Local lowering of water tables has caused many seeps and springs to dry during part of the year. Maintenance of saturated to inundated soil conditions are essential to maintenance of the unique forb, grass, and sedge community dependent upon these sites. Without wet conditions, the site would soon be dominated by more xeric species from surrounding habitats. Management activities are frequently needed to maintain canopy closure as appropriate over these communities and to ensure maintenance of the water table. Current information on location and size of this community type is not well documented.

The key characteristics and performance measures for this group are the same as for the ecological system seeps, springs, and seepage swamps Table G 51. Forestwide desired conditions as well as desired conditions for seeps, springs, and seepage swamps serve as forest plan components for these species. Guidelines include vegetation/wildlife; soil and water; roads; invasive species; herbicides; and administration, facilities, and recreation.

Table G 50. Species in seeps, springs and seepage swamps associates

Species Name	Common Name	Species-to-Group Weight
Aster puniceus	Purple-stemmed Aster	Very High
Carex exilis	Coast Sedge	Moderate
Carex stricta	Uptight Sedge	Very High
Chamaecyparis thyoides	Atlantic White Cedar	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Very High
Dryopteris X australis	Small's Woodfern	Very High
Epidendrum magnoliae = conopseum	Green-fly Orchid	High
Isoetes louisianensis	Louisiana Quillwort	Very High
Isoetes melanopoda	Blackfoot Quillwort	Very High
Isoetes valida	Strong Quillwort	Very High
Lindera subcoriacea	Bog Spicebush	High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Low
Macranthera flammea	Flame Flower	High
Mimulus ringens	Square-stem Monkey Flower	High
Panicum nudicaule	Naked-stemmed Panic Grass	High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Peltandra sagittifolia	White Arum	Very High
Pinguicula planifolia	Chapman's Butterwort	High
Pinguicula primuliflora	Southern Butterwort	Very High
Platanthera blephariglottis	Large White Fringed Orchid	High
Platanthera integra	Yellow Fringeless orchid	High
Polygala hookeri	Hooker's Milkwort	Moderate
Pseudotriton montanus	Mud Salamander	Very High
Solidago flaccidifolia	Appalachian Goldenrod	Moderate
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	Moderate
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Low
Stylisma aquatica	Water Southern Morning-glory	High
Syngonanthus flavidulus	Yellow Pipewort	Moderate
Trachyxiphium heteroicum (Hookeriopsis heteroica)	Trachyxiphium Moss	Very High
Utricularia olivacea	Piedmont Bladderwort	Moderate
Utricularia purpurea	Purple Bladderwort	Moderate
Uvularia floridana	Florida Bellwort	Low
Xyris drummondii	Drummond's Yellow-eyed Grass	Low

Table G 51. Species in seeps, springs and seepage swamps associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Moderate
	Percent of System Acres Burned During the Growing Season	Moderate
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	Moderate
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Low
	Unpaved Open Road Density	High
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	High
Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
	Road Crossings Rating	High
Persistence of Species Occurrences	Compliance with Species Occurrence Guidelines	Very High
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Very High

Wet Pine Savanna Associates

These species occupy rare wetland systems of open savannas dominated by grasses, sedges, orchids, and carnivorous plants. A list of targeted species associated with this species group can be found in Table G 52. Occurrences on the Forests typically have too much canopy closure with resultant negative impacts on hydrologic regime.

Carnivorous plants are diagnostic, especially pitcher plants. Pitcher plants range from dominant or co-dominant to sparse, and several species may be present. Where ephemeral ponds and emergent wetlands are interspersed, this is habitat for the endangered Mississippi sandhill crane. Frequent fires, including growing-season burns, are essential for stimulating rich understories of grasses and forbs. Inventory, mapping, and developing rapid assessment protocols are priorities for species sustainability.

Many wet pine savanna sites have been converted to forest or support only depauperate communities due to a long history of exploitation, system drainage and fire suppression. Management activities are frequently needed to restore healthy hydrologic function, historical fire regimes, and characteristic grass-forb understories.

Table G 52. Species in wet pine savanna associates

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Very High
Agalinis filicaulis	Thin Stemmed False-foxglove	Very High
Ammodramus henslowii	Henslow's Sparrow	High
Atrytone arogos arogos	Arogos Skipper	High
Calopogon barbatus	Bearded Grass-pink	Very High
Cirsium lecontei	LeConte's Thistle	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Very High
Colinus virginianus	Northern Bobwhite	Low
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	High
Eriocaulon texense	Texas Pipewort	Very High
Fallicambarus danielae	Speckled Burrowing Crayfish	High
Gaylussacia frondosa	Dangleberry	High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Moderate
Marshallia graminifolia var. cynanthera	Broadleaf Barbara's Buttons	Moderate
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	Very High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Procambarus fitzpatricki	Spiny-tailed Crayfish	High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	High
Rhadinaea flavilata	Pine Woods Snake	High
Rhynchospora macra	Large Beakrush	Very High
Ruellia noctiflora	Night Flowering Ruellia	High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High
Stylisma aquatica	Water Southern Morning-glory	High
Xyris drummondii	Drummond's Yellow-eyed Grass	High

The key attributes and indicator metrics for this group are the same as for the ecological system wet pine savanna (Table G 53). Relative abundance is the key factor for restoration of this ecological system and is a vital in providing for species sustainability. Forestwide desired conditions as well as desired conditions for wet pine savannas and species diversity serve as forest plan components for these species. Objectives for restoration of wet pine savanna also sustain this species group; along with guidelines for vegetation/wildlife; soil and water; roads; herbicides; and administration, facilities, and recreation.

Table G 53. Wet pine savanna associates key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Wet Pine Savanna	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Moderate
			Total Road and Trail Density	High
			Unpaved Gated Road Density	Low
			Unpaved Open Road Density	Moderate
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
		Vegetation Structure	% Open	Very High
		Indicator Species Status	Population Trend of yellow trumpets (*Sarracenia alata* Alph. Wood)	High
		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
			Percent of Invasive Species Occupying System	Very High
			Reduction of Fire Ants	Very High
SG	Wet Pine Savanna Associates	Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High
			Compliance with Downed Wood Guidelines	Very High
			Compliance with Snag Guidelines	Very High
			Compliance with Stump and Stump-hole Guidelines	Very High
		Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High

Xeric Sandhill Associates

Xeric sandhills are a unique habitat type in Mississippi and are a vital component of many species ecological needs. For planning purposes, they have been defined as gopher tortoise priority soils and are the driest of the upland sites occurring on the Chickasawhay and De Soto NFs. All management decisions made within these areas should focus on sustainability of the federally threatened gopher tortoise. A list of all targeted species associated with this species group can be found in Table G 54. The tortoise serves as a keystone species for many species on this list. Its burrows provide habitat otherwise unavailable for many of these species.

The key attributes and indicator metrics for this group are the same as for the ecological system xeric sandhills (Table G 55). Forestwide desired conditions as well as desired conditions for longleaf pine, xeric sandhills, and species diversity serve as forest plan components for these species. Objectives to restore or

maintain xeric sandhills and woodland condition in longleaf pine forest help to sustain these species, along with guidelines for vegetation/wildlife; roads; fire; and administration, facilities, and recreation.

Table G 54. Species in xeric sandhills associates

Species Name	Common Name	Species-to-Group Weight
Colinus virginianus	Northern Bobwhite	Moderate
Crotalus adamanteus	Eastern Diamondback Rattlesnake	High
Gopherus polyphemus	Gopher Tortoise	Very High
Heterodon simus	Southern Hognose Snake	Very High
Ophisaurus mimicus	Mimic Glass Lizard	High
Peromyscus polionotus	Oldfield Mouse	Very High
Picoides borealis	Red-cockaded Woodpecker	Moderate
Pituophis melanoleucus lodingi	Black Pine Snake	High
Quercus minima	Dwarf Live Oak	Very High
Stylisma pickeringii var pattersonii	Patterson's Bindweed	Very High

Table G 55. Xeric sandhills associates key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Xeric Sandhills	Fire Regime	% System Acres Burned at Desired Return Interval	Very High
			% System Acres Burned During the Growing Season	Very High
		Distance from Roads	Total Road and Trail Density	High
		Ecological System Abundance at Desired Condition	% Ecological System Acres at Desired Condition	Very High
			% potential acres with Appropriate System	Very High
		Forest Age Diversity	% Mature Forest	Moderate
			% Old Forest	Moderate
			% Regenerating Forest	Moderate
		Vegetation Structure	% Mature Open and Sparse Canopy	Very High
			% Old-growth	Moderate
		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
			% Invasive Species Occupying System	Very High
			Reduction of Fire Ants	Very High
		Understory Composition	Compliance with Understory Composition Guidelines	Very High
SG	Xeric Sandhill Associates	Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High
			Compliance with Downed Wood Guidelines	Very High
			Compliance with Snag Guidelines	Very High
			Compliance with Stump and Stump-hole Guidelines	Very High

G.3.4 Terrestrial Species Groups Requiring Additional Forest Plan Components

This section provides details on groups of species that require further forest plan components in addition to those already provided by ecological diversity. Management strategies and appropriate forest plan components are described for each group. Species groups contain threatened and endangered, regional forester's sensitive species, and locally rare species arranged together for analysis purposes. These groups represent small spatial scales and groups of species associated with localized conditions and features that cross ecosystem boundaries. A list of targeted species groups needing additional forest plan components can be found in Table G 56. Targeted species within each group are in a table as each group is discussed.

Table G 56. Species groups requiring additional forest plan components

Species Group	Species Group
Bat Roost Structure Group	Species Sensitive to Hydrologic Modification of Wetlands
Den Tree Associates	Species Sensitive to Recreational Traffic (Terrestrial and Non-riverine Aquatic)
Downed Wood Associates	Species Needing Occurrence Protection
Forest Interior Birds	Stump and Stump-hole Associates
Species Sensitive to Fire Injury	Calciphiles
Snag Associates	Species Sensitive to Canopy Cover Modifications
Species Dependant on Fire to Maintain Habitat	Species Sensitive to Soil Disturbance

Bat Roost Structure Group

Bat species generally live in mature riparian areas on the Forests. They utilize bridges, cisterns, culverts, old abandoned houses, leaf litter, snags, and branches, bark, and cavities of live trees as roosts. They are insectivores and require some proximity to water. A list of targeted species associated with this species group can be found in Table G 57.

Table G 57. Species in bat roost structure group

Species Name	Common Name	Species-to-Group Weight
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	Very High
Lasiurus intermedius	Northern Yellow Bat	Very High
Myotis austroriparius	Southeastern Myotis	Very High
Myotis sodalis	Indiana Bat	Very High

Forest Plan Components

It is assumed that if the surrounding riparian area contains mature to old-growth closed-canopy forest with little or no unnatural disturbance, a sustainable amount of roost and hibernacula should be present. Ecological system sustainability forest plan components include desired conditions for floodplain forests, ephemeral ponds and emergent wetlands, and species diversity; and objectives for floodplain forests (Table G 58).

Table G 58. Bat roost structure key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
SG	Bat Roost Structure Group	Bat Roost Structure Availability	Compliance with Den Tree Protection Guidelines	Very High
			Compliance with Man-made Roost Structure Guidelines	Moderate
			Compliance with Snag Protection Guidelines	Very High
		Habitat Element Abundance	Compliance with Bat Roost Structure Guidelines	Very High
			Compliance with Den Tree Guidelines	Very High
			Compliance with Snag Guidelines	Very High
ES	Upland Longleaf Pine Forest and Woodland	Forest Age Diversity	% Mature Forest	High
			% Old Forest	Very High
ES	Southern Dry Upland Hardwood Forest	Forest Age Diversity	% Mature Forest	High
			% Old Forest	Very High
ES	Northern Dry Upland Hardwood Forest	Forest Age Diversity	% Mature Forest	High
			% Old Forest	Very High
ES	Southern Mesic Slope Forest	Forest Age Diversity	% Mature Forest	High
			% Old Forest	Very High
ES	Floodplain Forest	Forest Age Diversity	% Mature Forest	High
			% Old Forest	Very High
ES	Loblolly Pine Forest	Forest Age Diversity	% Mature Forest	High
ES	Slash Pine Forest	Forest Age Diversity	% Mature Forest	High
ES	Shortleaf Pine-Oak Forest and Woodland	Forest Age Diversity	% Mature Forest	High
			% Old Forest	High

Although ecological system forest plan components should supply ample amounts of suitable habitat for bats, there are additional needs for this group. It is necessary to retain snags and cavity trees for potential roosting by bats. Forest plan provisions to retain this habitat element help to insure sustainability of these species. In addition, human disturbance can interfere with roosting behavior and removal of existing artificial habitat can limit reproductive and foraging activity. Bridges, cisterns, and culverts should be checked for presence of bats before removal or modification of structure and alternative habitat should be provided when necessary.

The following guidelines were developed specifically for species in this group or address specific needs for this group:

- Before buildings, bridges, wells, cisterns, and other man-made structures are structurally modified or demolished, they should be surveyed for bats. If significant bat roosting is found, these structures should be maintained where consistent with multiple use objectives, or alternate roosts suitable for the species and colony size should be provided prior to adverse modification or destruction when feasible.

- New road bridge construction should include bat friendly technology and construction materials to provide roosting habitat for bat species-of-concern and species-of-interest.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.

Management Strategies

Beyond providing natural habitat, opportunities exist to enhance habitat by utilizing bat friendly bridge panels in future bridge reconstruction on the National Forests in Mississippi. Artificial roost installation can also improve bat habitat. Retention of snags and cavity trees during project implementation should create natural roosting structure for bats, and creation of vernal ponds should increase foraging areas for bats. Partnerships may foster bat habitat improvement projects.

Den Tree Associates

Den trees include cavities in both dead and live trees that are found in a variety of hardwood and softwood tree species. The species in this group require cavities or den trees for reproduction, shelter, and/or hibernation. A list of targeted species associated with this species group can be found in Table G 59. Large diameter hollow trees provide important denning habitat for the federally threatened black bear in Mississippi. Den trees are also important for sustaining the red-cockaded woodpecker and provide refuge for many other species including bats, small mammals, and amphibians and reptiles. It is necessary to recruit and retain these trees in areas where those species occur (Table G 60). Several bat species that are regional forester's sensitive species or locally rare species are included under the bat roost structure group description.

Table G 59. Species in den tree associates

Species Name	Common Name	Species-to-Group Weight
Aix sponsa	Wood Duck	High
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	High
Falco sparverius paulus	Southeastern American Kestrel	High
Myotis austroriparius	Southeastern Myotis	High
Picoides borealis	Red-cockaded Woodpecker	Very High
Ursus americanus	Black Bear	Very High
Myotis sodalis	Indiana Bat	Very High
Ursus americanus luteolus	Louisiana Black Bear	Very High

Table G 60. Den tree associates key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Upland Longleaf Pine Forest and Woodland	Forest Age Diversity	% Mature Forest	High
			% Old Forest	Very High
		Vegetation Structure	% Old-growth	Very High
ES	Southern Dry Upland Hardwood Forest	Forest Age Diversity	% Mature Forest	High
			% Old Forest	Very High
ES	Southern Mesic Slope Forest	Forest Age Diversity	% Mature Forest	High
			% Old Forest	Very High
ES	Floodplain Forest	Forest Age Diversity	% Mature Forest	High
			% Old Forest	Very High
		Vegetation Structure	% Old-growth	Very High
ES	Loblolly Pine Forest	Forest Age Diversity	% Mature Forest	High
		Vegetation Structure	% Old-growth	Very High
ES	Slash Pine Forest	Forest Age Diversity	% Mature Forest	High
		Vegetation Structure	% Old-growth	Very High
SG	Den Tree Associates	Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High

Forest Plan Components

It is assumed that sustainable populations of this species group will persist if intact mature riparian areas are maintained through filter strips, enhanced stream management zones, and protection of bottomland hardwood forests. Relative abundance of cavity trees would increase during this process. Assuming that mature forests and woodlands are present on the landscape and the additional forest plan components (guidelines) listed below are followed during vegetation management treatments, cavities available for nesting should remain abundant. Tree age diversity and presence of old-growth for all forested ecological systems is a surrogate measure for den tree associates. Ecological system sustainability forest plan components include desired conditions for forestwide ecosystem diversity, all forested ecological systems, streams and rivers, old-growth, and species diversity; objectives include those for floodplain forests and old-growth; and guidelines are those for soil and water sustainability.

Although ecosystem diversity forest plan components should supply ample amounts of suitable habitat for den tree associates, there are additional needs for this group. It is necessary to retain snags and cavity trees for potential use by species in this group. Forest plan provisions to retain this habitat element help to insure species sustainability.

The following guidelines would apply to den tree associates:

- Stumps, standing snags, and den trees should generally be retained to maintain structural diversity during vegetation management treatments. Exceptions may be made when necessary for insect or disease control or to provide for public and employee safety. Distribution of retained snags may be clumped.
- For as long as they remain suitable, known black bear den sites should be protected by prohibiting vegetation management and ground disturbing activities within a minimum of 100 feet around the den.

- Potential black bear den trees should be retained during all vegetation management treatments occurring in habitats suitable for bears. Potential den trees are those that are greater than 36 inches d.b.h. containing visible cavities.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.

Management Strategies

The key factors for sustainability of this group are recruitment of new den/cavity trees and retention of existing trees. Both of these can be measured through implementation monitoring using guidelines. Artificial cavity installation may be necessary for some of these species. Partnerships may enhance improvement of den tree species sustainability on the Forests.

Downed Wood Associates

Species in this association require downed and decaying wood for some vital part of their life history. A list of targeted species associated with this species group can be found in Table G 61. Downed wood provides shelter for many species and their prey items. Dusky gopher frog, Webster's salamander, ornate chorus frog, mud salamander, and pine woods snake are all tied to downed wood for some portion of their life cycle. The Trachyxiphium moss grows on permanently wet downed wood and cannot survive without it. Past forestry practices in Mississippi included removing stumps during vegetative management treatments. Retention of downed wood is essential for these species which is why retention guidelines are vital (Table G 62).

Table G 61. Species in downed wood associates

Species Name	Common Name	Species-to-Group Weight
Crotalus adamanteus	Eastern Diamondback Rattlesnake	Low
Hemidactylium scutatum	Four-toed Salamander	Low
Heterodon simus	Southern Hognose Snake	Moderate
Ophisaurus mimicus	Mimic Glass Lizard	Moderate
Pituophis melanoleucus lodingi	Black Pine Snake	Moderate
Plethodon websteri	Webster's Salamander	High
Pseudacris ornata	Ornate Chorus Frog	Moderate
Pseudotriton montanus	Mud Salamander	Moderate
Rana sevosa	Dusky Gopher Frog	Very High
Rhadinaea flavilata	Pine Woods Snake	High
Trachyxiphium heteroicum (Hookeriopsis heteroica)	Trachyxiphium Moss	High

Table G 62. Downed wood associates key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
SG	Downed Wood Associates	Habitat Element Abundance	Compliance with Downed Wood Guidelines	Very High

Forest Plan Components

Forestwide desired conditions as well as desired conditions for each forested ecological system and species diversity serve as ecological system sustainability forest plan components for these species. Objectives to restore or maintain mature and old-growth forest help to sustain these species.

Although ecological system sustainability forest plan components should supply ample amounts of suitable habitat, there are additional needs for this group. Given that past management practices have allowed for the removal of stumps, it is necessary to create additional forest plan components for their retention. Forest plan provisions to retain these habitat elements help to insure species sustainability.

The following guidelines would apply to this species group:

- Dead and downed logs or other woody debris should generally not be removed from rare communities. Where needed to ensure public or employee safety, snags may be felled, but will be retained within the community as downed wood.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.
- Historical skid roads, haul roads, log landings, and mechanical firelines should be reused.

Management Strategies

The major strategy for this group is the recruitment of new downed wood, stumps, and stump holes and retention of existing ones at the project level. Retention and recruitment can be measured through implementation monitoring and guidelines. It is assumed that the abundance of these habitat elements can be indirectly measured by the presence of mature and old-growth forest and woodland. Sustainable amounts of mature and old-growth forest in combination with retention guidelines provide downed wood into ecological systems. Guidelines for stump retention and minimization of ground disturbance are essential when considering the sustainability of species within this group. Although fire can destroy downed wood on the ground, it should not be excluded from use. The mud salamander and pine woods snakes occur in areas sufficiently moist to prevent fire from destroying downed wood in all but the driest of times. Forest plan guidance would limit direct firing and suggest that only low intensity flames should be used in these areas. The ornate chorus frog is an upland species and fire is critical to sustaining its habitat. Although fire may destroy some downed wood used by this species, having a sustainable supply of downed wood recruited into the system by a mature forest should be sufficient to sustain the species.

Forest Interior Birds

Forest interior birds require intact mature forests with no permanent fragmentation by agricultural or urban development. A list of targeted species associated with this species group can be found in Table G 63. Some fragmentation may be present as a result of timber harvesting, however this may only cause a temporary reduction in habitat for forest interior species. In most large landscapes, the needs of early successional species can be met quickly through various sources of disturbance, including timber harvesting. Much more time, however, is required to develop suitable habitat for species that require mature forest and other attributes (Table G 64). Effective conservation strategies must focus on maintaining adequate amounts of mature forest at any point in time.

Table G 63. Species in forest interior birds group

Species Name	Common Name	Species-to-Group Weight
Limnothlypis swainsonii	Swainson's Warbler	High
Hylocichla mustelina	Wood Thrush	High

Table G 64. Forest interior birds group key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Shortleaf Pine-Oak Forest and Woodland	Distance from Roads	ORV Trail Density	Moderate
			Paved Open Road Density	High
			Total Road and Trail Density	High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
		Forest Age Diversity	% Mature Forest	High
ES	Northern Dry Upland Hardwood Forest	Distance from Roads	ORV Trail Density	Moderate
			Paved Open Road Density	High
			Total Road and Trail Density	High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
		Forest Age Diversity	% Mature Forest	High
ES	Northern Mesic Hardwood Forest	Distance from Roads	ORV Trail Density	Moderate
			Paved Open Road Density	High
			Total Road and Trail Density	High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
		Forest Age Diversity	% Mature Forest	High
ES	Floodplain Forest	Distance from Roads	ORV Trail Density	Moderate
			Paved Open Road Density	High
			Total Road and Trail Density	High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
		Forest Age Diversity	% Mature Forest	High
SG	Forest Interior Birds	Forest Interior Abundance	Compliance with Forest Interior Guidelines	Very High
SG		Habitat Element Abundance	Compliance with Hard Mast Guidelines	High
SG			Compliance with Snag Guidelines	High
SG		Landscape Composition	% in Predominately Forested Landscapes	Very High

Forest Plan Components

Relative abundance of mature forest is a key factor for this species group, as is tree age diversity for all forested ecological systems. Forestwide desired conditions for ecosystem diversity, desired conditions for

each forested ecological system, and species diversity desired conditions serve as forest plan components for these species. Objectives to restore or maintain mature and old-growth forest help to sustain these species.

Although ecological system sustainability forest plan components help to sustain these species, more guidance is needed for sustainability of forest interior species on the National Forests in Mississippi. Planning forest regeneration in a matrix designed to sustain contiguous mature forest over time is of critical importance to these species.

The following guidelines would apply to forest interior bird associates:

- When planning stand regeneration, priority should be placed on locating new stands adjacent to existing young or regenerating stands to maximize the amount of contiguous forest. In accomplishing this, maximum regeneration opening sizes should be considered.
- Opening sizes created by timber harvest for silvicultural purposes should not exceed 80 acres for pine and pine/hardwood forest types and 40 acres for hardwood and hardwood/pine forest types. Openings should be considered regeneration for 10 years.
- New communication tower installation and ridge-top developments should be designed to mitigate collision impacts to migratory birds through coordination of project planning and implementation with the US Fish and Wildlife Service.
- When considering regeneration timber harvests, openings should be shaped and blended to the extent practicable with the natural terrain.

Management Strategies

Emphasis should be placed on maintaining contiguous blocks of mature forest to sustain these species. New treatments should be placed adjacent to young stands to allow for a sustained future of mature contiguous forest. This will temporarily increase the percentage of young forest, but it will contribute to the overall sustainability of interior species in the future and the effects should be minimized by not having more than 10 percent of the forest in young or regenerating condition at any given time.

Species Sensitive to Fire Injury

Individuals of these species are sensitive to fire injury. A list of targeted species associated with this species group can be found in Table G 65. Gopher frogs can be injured by effects of direct fire and fire can harm red-cockaded woodpecker cavity trees and fledglings. Atlantic white cedar has no fire tolerance and should be protected from fire. Oglethorpe oak, butternut, and big shellbark hickory have thin bark which makes them susceptible to negative effects from fire. Arogos skippers are both dependent upon fire to maintain their habitat and sensitive to injury of individuals and populations caused by fire. The rest of the species in this group occur in areas where only low intensity fires should occur, however, fires can occur in these areas resulting in death of individuals.

Table G 65. Species sensitive to fire injury

Species Name	Common Name	Species-to-Group Weight
Atrytone arogos arogos	Arogos Skipper	Very High
Carex impressinervia	Ravine Sedge	Very High
Carya laciniosa	Big Shellbark Hickory	High
Celastrus scandens	Climbing Bittersweet	High
Chamaecyparis thyoides	Atlantic White Cedar	Very High
Cornus alternifolia	Alternate-leaf Dogwood	High
Cypripedium parviflorum	Small Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High
Galearis spectabilis	Showy Orchis	Very High
Juglans cinerea	Butternut	Very High
Matelea oblique	Climbing Milkweed	High
Myotis sodatis	Indiana Bat	High
Pachysandra procumbens	Allegheny-spurge	Very High
Panax quinquefolius	American Ginseng	Very High
Physalis carpenter	Carpenter's Ground-cherry	Very High
Picoides borealis	Red-cockaded Woodpecker	Low
Quercus oglethorpensis	Ogelthorpe Oak	Very High
Rana sevosa	Missisippi Gopher Frog	Low
Schisandra glabra	Bay Starvine	High
Trillium foetidissimum	Fetid Trillium	Moderate
Triphora trianthophora	Three Birds Orchid	Very High
Uvularia floridana	Florida Bellwort	High

Forest Plan Components

These species would be partially covered by forest plan components for mesic ecological systems, including those related to fire, which indicates only low intensity fire should be used (Table G 66). However, species in this group are especially sensitive to the direct effects of fire, and care should be taken whenever fire is used in areas where they are known to occur. There are no direct key characteristics for this group, however project monitoring can determine if damage is occurring to species. These species are limited in occurrence on the Forests; therefore implementation of special provisions at the project level should not interfere with completion of work.

The following guidelines specific to these species should be used:

- Planning and implementation of prescribed burns should include measures to provide protection for known occurrences of threatened and endangered, regional forester’s sensitive species, and locally rare species that are susceptible to damage or extirpation from fire injury. This group is referred to as species sensitive to fire injury.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.

Table G 66. Species sensitive to fire injury key attributes and indicators

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
Fire Regime	Percent of System Acres Burned During the Growing Season	Very High
Fire Regime	Compliance with Prescribed Fire Guidelines	Very High

Management Strategies

When developing burn plans, the following should be considered at a minimum for all species in this group:

- Are any species from this group present or have potential to be present in project area?
- Is species habitat present in project area?
- What are the negative effects of fire to species?
- What protective measures can be performed to reduce impacts to species, i.e. burning during specific part of life-cycle (hibernation, non-breeding, dormancy, etc); protecting individuals from direct effects of fire; protecting duff layer in mesic areas; etc.?
- Are there sufficient populations of this species adjacent to the project area to re-populate after the project?
- Are there any additional techniques that can be used to reduce impacts?

Consideration of these questions and guidelines should provide for species in this group.

Snag Associates

Species in this association require standing snags for some vital part of their life history. A list of targeted species associated with this species group can be found in Table G 67. Standing snags provide shelter for many species and their prey items. Past forestry practices in Mississippi included removing standing snags during vegetative management treatments.

If retention / recruitment guidelines and other guidelines pertinent to creation of snags are followed, and there is a forestwide level of 30 percent mature and 10 percent old-growth forest that is within good or very good rating criteria, then we assume that we are adequately providing enough snags to sustain dependent species (Table G 68). Ecological system sustainability forest plan components include desired conditions for all associated ecological systems and specific guidelines.

Table G 67. Snag associates

Species Name	Common Name	Species-to-Group Weight
Aix sponsa	Wood Duck	Moderate
Falco sparverius paulus	Southeastern American Kestrel	Moderate
Myotis sodalis	Indiana Bat	Very High
Drycopus pileatus	Pileated Woodpecker	Very High

Table G 68. Snag associates key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
SG	Snag Associates	Habitat Element Abundance	% of Benchmark Acres of Mature Forest Systems	High
			% of Benchmark Acres of Old Forest Systems	High
			Compliance with Snag Guidelines	Very High

Forest Plan Components

Forestwide desired conditions as well as desired conditions for each forested ecological system and species diversity serve as ecological system sustainability forest plan components for these species. Objectives to restore or maintain mature and old-growth forest help to sustain these species.

Although ecological system sustainability forest plan components should supply ample amounts of suitable habitat, there are additional needs for this group. Given that past management practices have allowed for the removal of stumps, it is necessary to create additional forest plan components for their retention. Forest plan provisions to retain these habitat elements help to insure species sustainability.

The following guidelines would apply to this species group:

- Stumps, standing snags, and den trees should generally be retained to maintain structural diversity during vegetation management treatments. Exceptions may be made when necessary for insect or disease control or to provide for public and employee safety. Distribution of retained snags may be clumped.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.
- Historical skid roads, haul roads, log landings, and mechanical firelines should be reused.

Management Strategies

The major strategy for this group is the recruitment of new snags and retention of existing ones at the project level. Retention and recruitment can be measured through implementation monitoring and guidelines. It is assumed that the abundance of these habitat elements can be indirectly measured by the presence of mature and old-growth forest and woodland. Sustainable amounts of mature and old-growth forest in combination with retention guidelines provide snags into ecological systems. Guidelines for snag retention and minimization of ground disturbance are essential when considering the sustainability of species within this group. Although fire can destroy snags, it should not be excluded from use.

Species Dependent on Fire to Maintain Habitat

Many species of the southeastern forest depend on fire to maintain the health and wellbeing of their habitat. Prescribed burning is an important management tool in a healthy fire-adapted ecosystem by recycling nutrients back to the soil and increasing plant diversity and growth patterns. The season, frequency, frequency, and intensity of fire are critical variables that should be used based on the existing and desired vegetative communities and featured species. A list of targeted species associated with this species group can be found in Table G 69.

Table G 69. Species dependent on fire to maintain habitat

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Very High
Agalinis auriculata	Earleaf False-foxglove	Very High
Agalinis filicaulis	Thin Stemmed False-foxglove	Very High
Agalinis pseudaphylla	Shinner's False-foxglove	Very High
Aimophila aestivalis	Bachman's Sparrow	Very High
Ammodramus henslowii	Henslow's Sparrow	High
Aristida simpliciflora	Southern Three-awned Grass	Very High
Asclepias hirtella	Prairie Milkweed	Very High
Aster ericoides	White Heath Aster	Very High
Atrytone arogos arogos	Arogos Skipper	Very High
Calopogon barbatus	Bearded Grass-pink	Very High
Carex exilis	Coast Sedge	Very High
Carex microdonta	Small-Toothed Sedge	High
Cirsium lecontei	LeConte's Thistle	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Very High
Colinus virginianus	Northern Bobwhite	Very High
Crataegus harbisonii (=C. ashei)	Ashe Hawthorn	Very High
Crataegus triflora	Three-flower Hawthorn	Very High
Crotalus adamanteus	Eastern Diamondback Rattlesnake	High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Very High
Desmodium ochroleucum	Cream Tick-trefoil	Very High
Echinacea purpurea	Eastern Purple Coneflower	High
Eleocharis melanocarpa	Black-fruited Spikerush	High
Eleocharis robbinsii	Robbins Spikerush	Moderate
Eleocharis tricostata	Three-angled Spikerush	Moderate
Eriocaulon texense	Texas Pipewort	Very High
Falco sparverius paulus	Southeastern American Kestrel	Moderate
Fallicambarus danielae	Speckled Burrowing Crayfish	Very High
Fallicambarus gordoni	Camp Shelby Burrowing Crayfish	Very High
Gaylussacia frondosa	Dangleberry	Very High
Gopherus polyphemus	Gopher Tortoise	Very High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Heterodon simus	Southern Hognose Snake	High
Isoetes louisianensis	Louisiana Quillwort	High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lindera subcoriacea	Bog Spicebush	High
Linum macrocarpum	Spring Hill flax	Very High
Lobelia appendiculata	Appendaged Lobelia	High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	High
Macranthera flammea	Flame Flower	High
Marshallia graminifolia var. cynanthera	Broadleaf Barbara's Buttons	High

Species Name	Common Name	Species-to-Group Weight
Ophisaurus mimicus	Mimic Glass Lizard	Very High
Panicum nudicaule	Naked-stemmed Panic Grass	Very High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	High
Peltandra sagittifolia	White Arum	High
Peromyscus polionotus	Oldfield Mouse	Very High
Picoides borealis	Red-cockaded Woodpecker	Very High
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	High
Pituophis melanoleucus lodingi	Black Pine Snake	Very High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Polygala hookeri	Hooker's Milkwort	Very High
Polygala leptostachys	Slender Spike Milkwort	Very High
Polytaenia nuttallii	Prairie Parsley	Very High
Prenanthes aspera	Rough Rattlesnake-root	High
Procambarus barbiger	Jackson Prairie Crayfish	Very High
Procambarus fitzpatricki	Spiny-tailed Crayfish	Very High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	Very High
Quercus minima	Dwarf Live Oak	Very High
Rana sevosa	Duskey Gopher Frog	Very High
Rhadinaea flavilata	Pine Woods Snake	Moderate
Rhamnus lanceolata	Lance-leaved Buckthorn	High
Rhynchospora crinipes	Hairy Peduncled Beakrush	High
Rhynchospora macra	Large Beakrush	Very High
Rhynchospora stenophylla	Chapman Beakrush	Very High
Ruellia noctiflora	Night Flowering Ruellia	High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High
Spiranthes magnicamporum	Great Plains Ladies'-tresses	Very High
Syngonanthus flavidulus	Yellow Pipewort	Very High
Xyris drummondii	Drummond's Yellow-eyed Grass	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Forest plan Components

Ecological system sustainability components include desired conditions for forestwide ecosystem diversity, all ecological systems, old-growth, and guidelines for prescribed burning (Table G 70).

The following guidelines would apply to this species group:

- Planning and implementation of prescribed burns should include measures to provide protection for known occurrences of threatened and endangered, sensitive, and locally rare species that are

susceptible to damage or extirpation from fire injury. This group is referred to as species sensitive to fire injury.

- During prescribed burning, some fires should be allowed to burn in a mosaic pattern resulting from differential influence of topography, fuel loading and moisture, and vegetation type.
- Existing barriers (e.g., streams, lakes, wetlands, roads, and trails) should be used whenever possible to reduce the need for fireline construction and to minimize resource impacts.

Table G 70. Species dependent on fire to maintain habitat sample performance measures, may vary by location and unit

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Upland Longleaf Pine Forest and Woodland	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
			Percent of Invasive Species Occupying System	Very High
			Reduction of Fire Ants	Very High
ES	Southern Dry Upland Hardwood Forest	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Moderate
			Percent of System Acres Burned During the Growing Season	Moderate
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Moderate
		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Moderate
			Percent of Invasive Species Occupying System	Moderate
			Reduction of Fire Ants	Moderate
ES	Near-coast Pine Flatwoods	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
			Percent of Invasive Species Occupying System	Very High
			Reduction of Fire Ants	Very High

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Xeric Sandhills	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
			Percent of Invasive Species Occupying System	Very High
			Reduction of Fire Ants	Very High
ES	Wet Pine Savanna	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
			Percent of Invasive Species Occupying System	Very High
			Reduction of Fire Ants	Very High
ES	Herbaceous Seepage Bogs and Flats	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
			Percent of Invasive Species Occupying System	Very High
			Reduction of Fire Ants	Very High
ES	Loblolly Pine Forest	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Ecological System Abundance at Desired Condition	Percent of Ecological System Acres at Desired Condition	Very High
		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
			Percent of Invasive Species Occupying System	Very High
			Reduction of Fire Ants	Very High

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Slash Pine Forest	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Ecological System Abundance at Desired Condition	Percent of Ecological System Acres at Desired Condition	Very High
		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
			Percent of Invasive Species Occupying System	Very High
			Reduction of Fire Ants	Very High

Management Strategies

Varying the season, frequency, and intensity of prescribed fire is critical to sustainability of species in this group. Prescribed burns occurring in the dormant season provide vastly different results from prescribed burns occurring in the growing season. Every effort should be made to increase the use of fall burns after growth of native warm season grasses has ceased for the year.

Species Sensitive to Hydrologic Modification of Wetlands

Species in this group (Table G 71) are associated with wetlands, including, but not limited to seeps, springs, bogs, swamps, wet flatwoods and ephemeral ponds and are dependent on hydrological integrity in these habitats.

Table G 71. Species sensitive to hydrologic modification of wetlands

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Very High
Agalinis filicaulis	Thin Stemmed False-foxglove	Very High
Alisma subcordatum	Broad-leaved Water-platain	High
Alloperla natchez	Natchez Stonefly	Very High
Aristida simpliciflora	Southern Three-awned Grass	Very High
Aster puniceus	Purple-stemmed Aster	Very High
Calopogon barbatus	Bearded Grass-pink	Very High
Carex decomposita	Cypress-knee Sedge	Very High
Carex exilis	Coast Sedge	Very High
Carex stricta	Uptight Sedge	High
Chamaecyparis thyoides	Atlantic White Cedar	Very High
Cirsium lecontei	LeConte's Thistle	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Very High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Very High
Dryopteris X australis	Small's Woodfern	Very High
Eleocharis melanocarpa	Black-fruited Spikerush	Very High

Species Name	Common Name	Species-to-Group Weight
Eleocharis robbinsii	Robbins Spikerush	Very High
Eleocharis tricostata	Three-angled Spikerush	Very High
Epidendrum magnoliae = conopseum	Green-fly Orchid	Very High
Eriocaulon texense	Texas Pipewort	Very High
Fallicambarus danielae	Speckled Burrowing Crayfish	Very High
Fallicambarus gordoni	Camp Shelby Burrowing Crayfish	Very High
Gaylussacia frondosa	Dangleberry	Very High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Haploperla chukcho	Chukcho Stonefly	Very High
Hemidactylium scutatum	Four-toed Salamander	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Isoetes melanopoda	Blackfoot Quillwort	Very High
Isoetes valida	Strong Quillwort	Very High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lindera melissifolia	Pondberry	Very High
Lindera subcoriacea	Bog Spicebush	Very High
Linum macrocarpum	Spring Hill flax	Very High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Very High
Macranthera flammea	Flame Flower	Very High
Marshallia graminifolia var. cynanthera	Broadleaf Barbara's Buttons	High
Mimulus ringens	Square-stem Monkey Flower	Very High
Myriophyllum laxum	Loose Watermilfoil	Very High
Panicum nudicaule	Naked-stemmed Panic Grass	Very High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Peltandra sagittifolia	White Arum	Very High
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	Very High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Platanthera peramoena	Purple Fringeless Orchid	Very High
Polygala hookeri	Hooker's Milkwort	Very High
Pseudotriton montanus	Mud Salamander	Very High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	Very High
Pycnanthemum muticum	Blunt Mountainmint	High
Rana sevosa	Dusky Gopher Frog	Very High
Rhynchospora crinipes	Hairy Peduncled Beakrush	Very High
Rhynchospora macra	Large Beakrush	Very High
Rhynchospora stenophylla	Chapman Beakrush	Very High
Ruellia noctiflora	Night Flowering Ruellia	High
Sagittaria isoetiformis	Slender Arrow-head	Very High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High

Species Name	Common Name	Species-to-Group Weight
Stylisma aquatica	Water Southern Morning-glory	High
Syngonanthus flavidulus	Yellow Pipewort	Very High
Trachyxiphium heteroicum (Hookeriopsis heteroica)	Trachyxiphium Moss	Very High
Utricularia olivacea	Piedmont Bladderwort	Very High
Utricularia purpurea	Purple Bladderwort	Very High
Xyris drummondii	Drummond's Yellow-eyed Grass	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Forest plan Components

Ecological system sustainability components include desired conditions for forestwide ecosystem diversity, all ecological systems, old-growth, and guidelines for maintaining the integrity of hydrologic function (Table G 72).

Table G 72. Species sensitive to hydrologic modification of wetlands sample performance measures, may vary by location and unit

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Near-coast Pine Flatwoods	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Distance from Roads	ORV Trail Density	High
			Paved Open Road Density	High
			Total Road and Trail Density	High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	High
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	High
ES	Ephemeral Ponds and Emergent Wetlands	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	Very High
			Unpaved Open Road Density	Very High
		Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Wet Pine Savanna	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	Very High
			Unpaved Open Road Density	Very High
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
ES	Seeps, Springs, and Seepage Swamps	Fire Regime	Percent of System Acres Burned at Desired Return Interval	High
			Percent of System Acres Burned During the Growing Season	High
		Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	Very High
			Unpaved Open Road Density	Very High
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
ES	Herbaceous Seepage Bogs and Flats	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
			Percent of System Acres Burned During the Growing Season	Very High
		Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	Very High
			Unpaved Open Road Density	Very High
		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
SG	Species Sensitive to Hydrologic Modification of Wetlands	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High

The following guidelines would apply to this species group:

- Best management practices (BMPs) should be used during ground disturbing activities.
- Activities that could result in sedimentation or other changes in water quantity and quality should have project level design criteria that maintained or improved the hydrologic function of wetland communities.
- Erosion control measures should be applied in all ground disturbing activities to reduce movement of bare soil and minimize direct delivery of sediment to streams or other water bodies. Appropriate erosion control measures (install water diversion, re-vegetation, mulch, silt fence, etc.) should be implemented as promptly as practical.
- Filter strips should be used to protect perennial and intermittent streams. Filter strips should be at least 33 feet plus 1.5 times the percent slope. Activities that expose more than 10 percent mineral soil should be avoided unless the activity occurs at a designated crossing. Site specific analysis should determine any mitigation measures in addition to standard BMPs needed to protect water quality.
- Mechanical equipment may operate as long as the soils are dry enough to sustain activity without excessive compaction or rutting. In order to minimize resource damage, access may be restricted during wet seasons or following rainfall events. This guideline does not apply to dedicated intensive use areas such as roads, primary skid trails, and logging decks. Ruts should be smoothed to restore hydrology and drainage paths.
- Plowed firelines are not located within savannahs except when needed to protect facilities or threatened, endangered, proposed, or sensitive species.
- Management activities planned within rare ecological systems should generally be limited to maintenance or restoration activities addressing their specific composition, structure, or natural system function needs.

Management Strategies

The vast majority of wetland communities and the species dependent on them have been degraded to a greater or lesser extent by past management activities that have served to drain away water, retain water to an unacceptable level (create ponds where they did not occur), or speed up runoff. Each affected example must be examined on a case by case basis to determine the best method to restore the desired community.

Species Sensitive to Recreational Traffic (Terrestrial and Non-riverine Aquatic)

Species in this group are sensitive to excessive human disturbance such as trampling, harassment, vehicular mortality, and direct mortality. Reptile species are especially sensitive to being harmed, harassed, and killed by humans. This interaction with humans can have long-term negative effects on population sizes and sustainability. The black bear is sensitive to high road densities. Dusky gopher frog, gopher tortoise, and snake and plant species on this list are especially sensitive to harm due to off-road vehicles, heavy equipment, horses, and human traffic. Some species are collected commercially and used for a variety of purposes including but not limited to food, medicinal, decorative, gardening/landscaping, pet trade. A list of targeted species associated with this species group can be found in Table G 73.

Direct effects of mortality for this species group could be limited by the implementation of guidelines which protect species from direct take, intentional killing or harassment, and limit access to sensitive populations of these species. Providing habitat for these species is not enough to ensure long-term sustainability of populations. The correlation between occurrence and distance to roads is an important attribute for these species' sustainability (Table G 74). The following actions could be implemented to

reduce impacts to these species by adopting them as Forest policy; design roads to avoid highly populated areas of these species; design roads to include safe passage for these species; provide educational materials to the public to increase knowledge and awareness of species needs; work collaboratively with state agencies to limit take of fish species in this group on NFS lands; limit recreational access to sensitive habitats associated with species on this list; require regulations on collecting permits to limit collections to approved scientific purposes only. Includes but not limited to direct impacts from ORVs, horses, mountain bikes, and other conveyances as well as direct impacts caused by the activities of persons utilizing said conveyances.

Table G 73. Species sensitive to recreational traffic

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Very High
Agalinis auriculata	Earleaf False-foxglove	Very High
Agalinis filicaulis	Thin Stemmed False-foxglove	Very High
Agalinis pseudaphylla	Shinner's False-foxglove	Very High
Alisma subcordatum	Broad-leaved Water-platain	High
Antennaria solitaria	Single-headed Pussytoes	High
Arabis canadensis	Sicklepod	Very High
Aralia racemosa	American Spikenard	Very High
Aristida simpliciflora	Southern Three-awned Grass	Very High
Asarum canadense	Canada Wild-ginger	Very High
Asclepias hirtella	Prairie Milkweed	High
Aster ericoides	White Heath Aster	High
Aster puniceus	Purple-stemmed Aster	High
Calopogon barbatus	Bearded Grass-pink	Very High
Carex decomposita	Cypress-knee Sedge	High
Carex exilis	Coast Sedge	Very High
Carex impressinervia	Ravine Sedge	Very High
Carex microdonta	Small-Toothed Sedge	Very High
Carex picta	Painted Sedge	High
Celastrus scandens	Climbing Bittersweet	High
Cirsium lecontei	LeConte's Thistle	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	High
Cornus alternifolia	Alternate-leaf Dogwood	Moderate
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	Low
Crataegus harbisonii (=C. ashei)	Ashe Hawthorn	Moderate
Crataegus triflora	Three-flower Hawthorn	Very High
Crotalus adamanteus	Eastern Diamondback Rattlesnake	Very High
Cypripedium parviflorum	Small Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Very High
Desmodium ochroleucum	Cream Tick-trefoil	High
Dodecatheon meadia	Shootingstar	Very High

Species Name	Common Name	Species-to-Group Weight
Dryopteris ludoviciana	Southern Shield Woodfern	Very High
Dryopteris X australis	Small's Woodfern	Very High
Echinacea purpurea	Eastern Purple Coneflower	Very High
Eleocharis melanocarpa	Black-fruited Spikerush	High
Eleocharis robbinsii	Robbins Spikerush	High
Eleocharis tricostata	Three-angled Spikerush	High
Eriocaulon texense	Texas Pipewort	Very High
Erythronium albidum	White Dog's Tooth Violet	Very High
Euonymus atropurpureus	Burning Bush	Very High
Fallicambarus byersi	Lavender Burrowing Crayfish	Very High
Fallicambarus danielae	Speckled Burrowing Crayfish	Very High
Farancia erytrogramma	Rainbow Snake	Very High
Galearis spectabilis	Showy Orchis	Very High
Gaylussacia frondosa	Dangleberry	High
Goodyera pubescens	Downy Rattlesnake-plantain	Very High
Gopherus polyphemus	Gopher Tortoise	Very High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Haliaeetus leucocephalus	Bald Eagle	Moderate
Heterodon simus	Southern Hognose Snake	Very High
Hexalectris spicata	Crested Coralroot	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Isoetes melanopoda	Blackfoot Quillwort	Very High
Isoetes valida	Strong Quillwort	Very High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lindera melissifolia	Pondberry	Very High
Lindera subcoriacea	Bog Spicebush	Very High
Linum macrocarpum	Spring Hill flax	Very High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Moderate
Lycopodium digitatum = flabelliforme	Fan Club Moss	Moderate
Macranthera flammea	Flame Flower	High
Matelea obliqua	Climbing Milkweed	Moderate
Mimulus ringens	Square-stem Monkey Flower	Moderate
Myotis austroriparius	Southeastern Myotis	Low
Myotis sodalis	Indiana Bat	Low
Myriophyllum laxum	Loose Watermilfoil	Low
Ophisaurus mimicus	Mimic Glass Lizard	Very High
Pachysandra procumbens	Allegheny-spurge	Very High
Panax quinquefolius	American Ginseng	Very High
Panicum nudicaule	Naked-stemmed Panic Grass	Very High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Peltandra sagittifolia	White Arum	High

Species Name	Common Name	Species-to-Group Weight
Physalis carpenteri	Carpenter's Ground-cherry	Very High
Picoides borealis	Red-cockaded Woodpecker	Moderate
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	Very High
Pituophis melanoleucus lodingi	Black Pine Snake	Very High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Platanthera peramoena	Purple Fringeless Orchid	High
Polemonium reptans	Jacob's Ladder	Very High
Polygala hookeri	Hooker's Milkwort	Very High
Polygala leptostachys	Slender Spike Milkwort	Very High
Polytaenia nuttallii	Prairie Parsley	Very High
Ponthieva racemosa	Shadow-witch Orchid	Very High
Prenanthes aspera	Rough Rattlesnake-root	Very High
Procambarus barbiger	Jackson Prairie Crayfish	Very High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	Very High
Rana sevosa	Dusky Gopher Frog	Very High
Rhynchospora macra	Large Beakrush	Very High
Rhynchospora stenophylla	Chapman Beakrush	Very High
Ruellia noctiflora	Night Flowering Ruellia	High
Salvia urticifolia	Nettle-leaf Sage	High
Schisandra glabra	Bay Starvine	High
Solidago auriculata	Eared Goldenrod	Very High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	Very High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High
Syngonanthus flavidulus	Yellow Pipewort	Very High
Triphora trianthophora	Three Birds Orchid	Very High
Ursus americanus	Black Bear	Very High
Ursus americanus luteolus	Louisiana Black Bear	Very High
Uvularia floridana	Florida Bellwort	High
Xyris drummondii	Drummond's Yellow-eyed Grass	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Table G 74. Species sensitive to recreational traffic key attributes and indicators

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ESES	Upland Longleaf Pine Forest and Woodland	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High
ES	Southern Dry Upland Hardwood Forest	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High
ES	Southern Mesic Slope Forest	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High
ES	Floodplain Forest	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High
ES	Near-coast Pine Flatwoods	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High
ES	Xeric Sandhills	Distance from Roads	Total Road and Trail Density	Very High
ES	Ephemeral Ponds and Emergent Wetlands	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High
ES	Wet Pine Savanna	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Seeps, Springs, and Seepage Swamps	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High
ES	Herbaceous Seepage Bogs and Flats	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High
ES	Canebrake	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High
ES	Loblolly Pine Forest	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High
ES	Slash Pine Forest	Distance from Roads	ORV Trail Density	Very High
			Paved Open Road Density	Very High
			Total Road and Trail Density	Very High
			Unpaved Gated Road Density	High
			Unpaved Open Road Density	Very High

Forest plan Components

Collection limits for fishable/huntable and non-game species are set by Mississippi Department of Wildlife, Fisheries, and Parks; therefore issues of excessive take are beyond Forest Service control. However, issues pertaining to illegal collection and vegetation collections on the Forests can be regulated. Forest plan components include species diversity desired conditions and the following guidelines to limit collection of species occurring within rare communities to approved scientific purposes only:

- Collection of flora and fauna from rare communities, wetland systems, and species sensitive to over-collection group should generally be limited to approved scientific purposes.
- Where necessary and consistent with other uses, consideration should be given to seasonal closure of NFS roads during critical periods for wildlife species known to be sensitive to human disturbance.
- If unacceptable resource damage is identified in a section of any trail, that section should be closed for mitigation, rerouted and/or obliterated.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include measures to provide protection for threatened and endangered, regional forester's sensitive species, and locally

rare species that are susceptible to damage or extirpation from ground disturbance. These are referred to as species sensitive to soil disturbance and species sensitive to recreational traffic.

Management Strategies

The strategy for these species is to continue to educate the public on species needs, restrict access to rare or sensitive populations, increase road ecopassage, and implement guidelines to protect these species where they occur during projects that involve heavy equipment or ground disturbance. New roads and trails should be located so as to avoid populations of these species and existing roads and trails should be evaluated for closure if they are causing declines to populations. Implementation of the Travel Management Rule should assist in reducing ORV impacts to these species by closing user created trails. Many roads on the Forests are not under our control, so partnerships and collaborative efforts may be required to help sustain species in this group.

As stated above, collection limits for fishable/ huntable and non-game species are set by Mississippi Department of Wildlife, Fisheries, and Parks, so issues of excessive take are beyond Forest Service control. However, we should explore opportunities to limit access to areas with sensitive populations of these species when feasible. The strategy for these species is to continue to educate the public on species needs, restrict access to known populations, and limit approval of collections of these species to scientific purposes only.

Species Needing Occurrence Protection

Species in this group (Table G 75) are rare in occurrence on the National Forests in Mississippi although habitat is widespread. Habitat assessments cannot accurately predict the presence of these species. Most of these species occur in less than five populations on the Forests and are sensitive to management actions. Those species which have more than five known occurrences represent populations which are critical to the survival of the species and have limited occurrence outside of the National Forests in Mississippi. Threatened and endangered species are not included in this group because they require species-specific protection and guidance.

Table G 75. Species needing occurrence protection

Species Name	Common Name	Species-to-Group Weight
Agalinis auriculata	Earleaf False-foxglove	Very High
Aralia racemosa	American Spikenard	Very High
Atrytone arogos arogos	Arogos Skipper	Very High
Carex decomposita	Cypress-knee Sedge	Very High
Carex exilis	Coast Sedge	Very High
Carex impressinervia	Ravine Sedge	Very High
Chamaecyparis thyoides	Atlantic White Cedar	Very High
Crataegus harbisonii (=C. ashei)	Ashe Hawthorn	Very High
Crataegus triflora	Three-flower Hawthorn	Very High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Very High
Dryopteris X australis	Small's Woodfern	Very High
Fallicambarus gordoni	Camp Shelby Burrowing Crayfish	Very High
Galearis spectabilis	Showy Orchis	Very High
Goodyera pubescens	Downy Rattlesnake-plantain	Very High

Species Name	Common Name	Species-to-Group Weight
Gopherus polyphemus	Gopher Tortoise	Very High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Haliaeetus leucocephalus	Bald Eagle	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Juglans cinerea	Butternut	Very High
Lindera melissifolia	Pondberry	Very High
Lindera subcoriacea	Bog Spicebush	Very High
Mimulus ringens	Square-stem Monkey Flower	Very High
Myotis sodalis	Indiana Bat	Very High
Myriophyllum laxum	Loose Watermilfoil	Very High
Nymphoides aquatica	Big Floating Heart	Very High
Nymphoides cordata	Floating Heart	Very High
Pachysandra procumbens	Allegheny-spurge	Very High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Picoides borealis	Red-cockaded Woodpecker	Very High
Procambarus fitzpatricki	Spiny-tailed Crayfish	Very High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	Very High
Rana sevosa	Dusky Gopher Frog	Very High
Solidago auriculata	Eared Goldenrod	Very High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	Very High
Triphora trianthophora	Three Birds Orchid	Very High
Uvularia floridana	Florida Bellwort	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Forest plan Components

Because these species are low in occurrence across the National Forests in Mississippi and cannot be accurately predicted by availability of habitat, ecosystem and species diversity forest plan components should provide some protection for these species; however additional provisions are needed due to their rarity and sensitivity to management. The following guideline was created to protect these species:

- Project planning and implementation should include measures to provide protection for the “species need occurrence protection” group.

Management Strategies

These species are rare in occurrence across the forest and known populations should be protected. Protection of habitat alone does not ensure protection of these species in most cases, and protection should be given to individuals when work is performed at known locations. The key strategy for members of this group is the use of “ecological life-boats” to conserve “the last of the least and the best of the rest”. A coordinated forest plan will be implemented to insure these species are protected in designated sites in sufficient numbers to insure sustainability. Existing reserves such as research natural areas, botanical areas, etc. should be utilized to the extent possible. Multiple species will occur in the same reserve.

Stump and Stump-hole Associates

Stumps and stump holes provide a network of underground chambers that support many species (Table G 76) throughout their life cycle. Past forestry practices in Mississippi included removing stumps during vegetative management treatments. Species associated with decaying stumps and stump-holes.

Table G 76. Stump and stump-hole associates

Species Name	Common Name	Species-to-Group Weight
Crotalus adamanteus	Eastern Diamondback Rattlesnake	High
Heterodon simus	Southern Hognose Snake	High
Ophisaurus mimicus	Mimic Glass Lizard	High
Pituophis melanoleucus lodingi	Black Pine Snake	Very High
Rana sevosa	Dusky Gopher Frog	High
Rhadinaea flavilata	Pine Woods Snake	Moderate

Forest plan Components

Forestwide desired conditions as well as desired conditions for each forested ecological system and species diversity serve as ecological system diversity forest plan components for these species. Objectives to restore or maintain mature and old-growth forest help to sustain these species.

Although ecological system diversity forest plan components should supply ample amounts of suitable habitat, there are additional needs for this group. Given that past management practices have allowed for the removal of stumps, it is necessary to create additional forest plan components for their retention. Forest plan provisions to retain these habitat elements help to insure species sustainability.

The following guidelines would apply to this species group:

- Dead and downed logs or other woody debris should generally not be removed from rare communities. Where needed to ensure public or employee safety, snags may be felled, but will be retained within the community as downed wood.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.
- Historical skid roads, haul roads, log landings, and mechanical firelines should be reused.

Management Strategies

The major strategy for this group is the recruitment of new downed wood, stumps, and stump holes and retention of existing ones at the project level. Retention and recruitment can be measured through implementation monitoring and guidelines. It is assumed that the abundance of these habitat elements can be indirectly measured by the presence of mature and old-growth forest and woodland. Sustainable amounts of mature and old-growth forest in combination with retention guidelines provide downed wood into ecological systems. Guidelines for stump retention and minimization of ground disturbance are essential when considering the sustainability of species within this group. Although fire can destroy downed wood on the ground, it should not be excluded from use. The mud salamander and pine woods snakes occur in areas sufficiently moist to prevent fire from destroying downed wood in all but the driest of times. Forest plan guidance should limit direct firing and suggest that only low intensity flames should be used in these areas. The ornate chorus frog is an upland species and fire is critical to sustaining its

habitat. Although fire may destroy some downed wood used by this species, having a sustainable supply of downed wood recruited into the system by a mature forest should be sufficient to sustain the species.

Calciphiles

Calciphiles are calcium loving vascular plant species that are dependent upon high levels of calcium in the soil to thrive. A list of targeted species associated with this species group can be found in Table G 77. They generally occur in the black belt, Jackson prairie and loess hills regions of Mississippi (Holly Springs, Tombigbee, and Bienville NFs). These areas are relatively small portions of the respective forests and offer excellent opportunities for biological reserves. Relative abundance of black belt and Jackson prairie is one of the many indicator performance measures for calciphiles (Table G 78). The management strategy for these species is to protect the soil on which they occur from degradation, as the assumption is that protecting the soil sustains the species.

Table G 77. Species in calciphiles associates

Species Name	Common Name	Species-to-Group Weight
Agalinis auriculata	Earleaf False-foxglove	High
Carya laciniosa	Big Shellbark Hickory	High
Dodecatheon meadia	Shootingstar	High
Erythronium albidum	White Dog's Tooth Violet	High
Euonymus atropurpureus	Burning Bush	High
Frasera caroliniensis	American Colombo	High
Juglans cinerea	Butternut	High
Quercus oglethorpensis	Oglethorpe Oak	High
Rhamnus lanceolata	Lance-leaved Buckthorn	High

Table G 78. Calciphiles key attributes and indicators

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
	Percent of System Acres Burned During the Growing Season	Very High
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	High
	Total Road and Trail Density	Very High
	Unpaved Gated Road Density	Moderate
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Vegetation Structure	% Open	Very High
Indicator Species Status	Population Trend of [indicator species name]	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	Very High

Forest plan Components

The desired condition for these species is to protect the soil on which they occur from degradation, as the assumption is that protecting the soil sustains the species. Desired conditions for ecological and species diversity and the guidelines for vegetation, wildlife, soil and water can provide for sustainability of these species.

Calciphilees are calcium loving plants. There are no measurable performance measures at this time, however, due to their limited occurrence and specific limiting factors, these species should be protected as found. Project level inventories should be completed for these species prior to project implementation. Groups of these species, when identified, should be mapped and protected from harm.

Management Strategies

Forest strategy to provide sustainable populations of the members of this species group is to identify location and aerial extent of calcareous soils. Until better soil mapping can be completed, project level mapping utilizing soil test kits will suffice. Presence of members of this species group can serve as indicators until soil testing is done. Since these calcareous soils are relatively rare, and many existing acres have been degraded, protection of all calcareous soil areas is desired.

Species Sensitive to Canopy Cover Modifications

Species sensitive to canopy cover reduction generally occur in areas with closed canopy desired conditions, especially hardwood dominated ecological systems; however, some of these areas may be targeted for vegetative management treatments. A list of targeted species associated with this species group can be found in Table G 79. When conducting projects where species sensitive to canopy cover reduction are known or suspected to occur, consideration should be given to maintaining closed canopy conditions to provide for sustainable species populations. Project level surveys may be necessary to determine species presence; however suitable habitat for the species may serve as a surrogate for surveys.

The key characteristic for this species group is percent of hardwood dominated systems in a mature closed canopy condition. Metrics for these are listed in the ecological systems northern dry upland hardwood forest, southern dry upland hardwood forest, northern mesic hardwood forest, southern mesic slope forest, southern loess bluff forest, floodplain forest, and lower Mississippi River bottomland and floodplain forest, as appropriate for each species (Table G 80).

Table G 79. Species sensitive to canopy cover modifications

Species Name	Common Name	Species-to-Group Weight
Alloperla natchez	Natchez Stonefly	Very High
Antennaria solitaria	Single-headed Pussytoes	High
Antennaria solitaria	Single-headed Pussytoes	High
Aralia racemosa	American Spikenard	Very High
Asarum canadense	Canada Wild-ginger	Very High
Carex impressinervia	Ravine Sedge	Very High
Carex picta	Painted Sedge	High
Celastrus scandens	Climbing Bittersweet	Moderate
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	Moderate
Cypripedium parviflorum	Small Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High

Species Name	Common Name	Species-to-Group Weight
Dryopteris ludoviciana	Southern Shield Woodfern	High
Dryopteris X australis	Small's Woodfern	High
Epidendrum magnoliae = conopseum	Green-fly Orchid	Very High
Erythronium albidum	White Dog's Tooth Violet	Very High
Galearis spectabilis	Showy Orchis	High
Goodyera pubescens	Downy Rattlesnake-plantain	High
Haploperla chukcho	Chukcho Stonefly	Very High
Hexalectris spicata	Crested Coralroot	High
Juglans cinerea	Butternut	High
Lindera melissifolia	Pondberry	Very High
Matelea obliqua	Climbing Milkweed	Moderate
Myotis austroriparius	Southeastern Myotis	Moderate
Myotis sodalis	Indiana Bat	Moderate
Pachysandra procumbens	Allegheny-spurge	Very High
Panax quinquefolius	American Ginseng	Very High
Physalis carpenteri	Carpenter's Ground-cherry	Very High
Plethodon websteri	Webster's Salamander	Very High
Polemonium reptans	Jacob's Ladder	Very High
Schisandra glabra	Bay Starvine	High
Solidago auriculata	Eared Goldenrod	Very High
Trillium foetidissimum	Fetid Trillium	Moderate
Triphora trianthophora	Three Birds Orchid	Very High
Uvularia floridana	Florida Bellwort	Very High

Table G 80. Species sensitive to canopy cover modifications key attributes and indicators

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Southern Dry Upland Hardwood Forest	Vegetation Structure	% Mature Closed Canopy	Very High
ES	Southern Mesic Slope Forest	Vegetation Structure	% Mature Closed Canopy	Very High
ES	Floodplain Forest	Vegetation Structure	% Mature Very-Closed Canopy	Very High
ES	Northern Dry Upland Hardwood Forest	Vegetation Structure	% Mature Closed Canopy	Very High
ES	Northern Mesic Hardwood Forest	Vegetation Structure	% Mature Closed Canopy	Very High
ES	Southern Loess Bluff Forest	Vegetation Structure	% Mature Closed Canopy	Very High
ES	Lower Mississippi River Bottomland and Floodplain Forest	Vegetation Structure	% Mature Closed Canopy	Very High

Forest plan Components

Desired conditions for closed canopy conditions for each of these ecological systems and vegetation/wildlife guidelines to maintain those conditions should be developed.

The following guidelines would apply to this species group:

- Planning and implementation of timber harvests and other silvicultural treatments that reduce canopy cover should include measures to provide protection for threatened and endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from canopy cover reduction.

Management Strategies

Forest strategy to maintain species sensitive to canopy cover reduction is to meet desired conditions for the referenced ecosystems. When conducting projects where species sensitive to canopy cover reduction are known or suspected to occur, consideration should be given to maintaining closed canopy conditions to provide for sustainable species populations. Project level surveys may be necessary to determine species presence; however suitable habitat for the species may serve as a surrogate for surveys.

Species Sensitive to Soil Disturbance

These are species considered to be especially impacted by excavation or blading of roads and trails, compaction of soil, soil erosion, soil sedimentation and others. A list of targeted species associated with this species group can be found in Table G 81. If a project has ground disturbing activities planned, than these species should be reviewed for occurrence and mitigation. Implementation monitoring and use of guidelines are the management tools used in ensuring sustainability of these species.

Table G 81. Species sensitive to soil disturbance

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	High
Agalinis auriculata	Earleaf False-foxglove	High
Agalinis filicaulis	Thin Stemmed False-foxglove	High
Agalinis pseudaphylla	Shinner's False-foxglove	High
Alisma subcordatum	Broad-leaved Water-platain	Moderate
Antennaria solitaria	Single-headed Pussytoes	Moderate
Arabis canadensis	Sicklepod	Very High
Aralia racemosa	American Spikenard	Very High
Aristida simpliciflora	Southern Three-awned Grass	Very High
Asarum canadense	Canada Wild-ginger	Very High
Asclepias hirtella	Prairie Milkweed	Very High
Aster ericoides	White Heath Aster	Very High
Aster puniceus	Purple-stemmed Aster	Very High
Calopogon barbatus	Bearded Grass-pink	Very High
Carex decomposita	Cypress-knee Sedge	High
Carex exilis	Coast Sedge	Very High
Carex impressinervia	Ravine Sedge	Very High
Carex microdonta	Small-Toothed Sedge	Very High
Carex picta	Painted Sedge	Very High
Carex stricta	Uptight Sedge	High

Species Name	Common Name	Species-to-Group Weight
Celastrus scandens	Climbing Bittersweet	Moderate
Chamaecyparis thyoides	Atlantic White Cedar	High
Cirsium lecontei	LeConte's Thistle	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Very High
Cornus alternifolia	Alternate-leaf Dogwood	Moderate
Crataegus harbisonii (=C. ashei)	Ashe Hawthorn	High
Crataegus triflora	Three-flower Hawthorn	High
Crotalus adamanteus	Eastern Diamondback Rattlesnake	Low
Cypripedium parviflorum	Small Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	High
Desmodium ochroleucum	Cream Tick-trefoil	Moderate
Dodecatheon meadia	Shootingstar	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Moderate
Dryopteris X australis	Small's Woodfern	Moderate
Echinacea purpurea	Eastern Purple Coneflower	Moderate
Eleocharis melanocarpa	Black-fruited Spikerush	High
Eleocharis robbinsii	Robbins Spikerush	High
Eleocharis tricostata	Three-angled Spikerush	High
Eriocaulon texense	Texas Pipewort	Very High
Erythronium albidum	White Dog's Tooth Violet	Very High
Euonymus atropurpureus	Burning Bush	Moderate
Fallicambarus byersi	Lavender Burrowing Crayfish	Very High
Fallicambarus danielae	Speckled Burrowing Crayfish	Very High
Fallicambarus gordoni	Camp Shelby Burrowing Crayfish	Very High
Frasera caroliniensis	American Colombo	High
Galearis spectabilis	Showy Orchis	Very High
Gaylussacia frondosa	Dangleberry	Moderate
Goodyera pubescens	Downy Rattlesnake-plantain	High
Gopherus polyphemus	Gopher Tortoise	Very High
Heterodon simus	Southern Hognose Snake	Very High
Hexalectris spicata	Crested Coralroot	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Isoetes melanopoda	Blackfoot Quillwort	Very High
Isoetes valida	Strong Quillwort	Very High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lindera melissifolia	Pondberry	Very High
Lindera subcoriacea	Bog Spicebush	Very High
Linum macrocarpum	Spring Hill flax	Very High
Lobelia appendiculata	Appendaged Lobelia	Moderate
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Moderate
Lycopodium digitatum = flabelliforme	Fan Club Moss	Moderate

Species Name	Common Name	Species-to-Group Weight
Macranthera flammea	Flame Flower	High
Matelea obliqua	Climbing Milkweed	Moderate
Mimulus ringens	Square-stem Monkey Flower	Moderate
Ophisaurus mimicus	Mimic Glass Lizard	High
Pachysandra procumbens	Allegheny-spurge	Very High
Panax quinquefolius	American Ginseng	Very High
Panicum nudicaule	Naked-stemmed Panic Grass	High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Peltandra sagittifolia	White Arum	High
Penstemon tenuis	Sharp-sepal Beardtongue	High
Physalis carpenteri	Carpenter's Ground-cherry	Very High
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	Very High
Pituophis melanoleucus lodingi	Black Pine Snake	High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Platanthera peramoena	Purple Fringeless Orchid	Moderate
Plethodon websteri	Webster's Salamander	High
Polemonium reptans	Jacob's Ladder	Very High
Polygala hookeri	Hooker's Milkwort	Very High
Polygala leptostachys	Slender Spike Milkwort	High
Polytaenia nuttallii	Prairie Parsley	Very High
Ponthieva racemosa	Shadow-witch Orchid	Very High
Prenanthes aspera	Rough Rattlesnake-root	High
Procambarus barbiger	Jackson Prairie Crayfish	Very High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	High
Pycnanthemum muticum	Blunt Mountainmint	Moderate
Quercus minima	Dwarf Live Oak	High
Quercus oglethorpensis	Oglethorpe Oak	High
Rana sevosa	Dusky Gopher Frog	High
Rhadinaea flavilata	Pine Woods Snake	Very High
Rhamnus lanceolata	Lance-leaved Buckthorn	Moderate
Rhynchospora macra	Large Beakrush	High
Rhynchospora stenophylla	Chapman Beakrush	Moderate
Ruellia noctiflora	Night Flowering Ruellia	Moderate
Salvia urticifolia	Nettle-leaf Sage	Moderate
Schisandra glabra	Bay Starvine	High
Solidago auriculata	Eared Goldenrod	Very High
Solidago flaccidifolia	Appalachian Goldenrod	High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High
Spiranthes magnicamporum	Great Plains Ladies'-tresses	Very High

Species Name	Common Name	Species-to-Group Weight
Stylisma aquatica	Water Southern Morning-glory	Moderate
Stylisma pickeringii var pattersonii	Patterson's Bindweed	Very High
Syngonanthus flavidulus	Yellow Pipewort	Very High
Trachyxiphium heteroicum (Hookeriopsis heteroica)	Trachyxiphium Moss	High
Trillium foetidissimum	Fetid Trillium	Moderate
Triphora trianthophora	Three Birds Orchid	Very High
Utricularia olivacea	Piedmont Bladderwort	Low
Utricularia purpurea	Purple Bladderwort	Low
Uvularia floridana	Florida Bellwort	High
Xyris drummondii	Drummond's Yellow-eyed Grass	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Table G 82. Species sensitive to soil disturbance key attributes and indicators

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Upland Longleaf Pine Forest and Woodland	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
ES	Southern Dry Upland Hardwood Forest	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
ES	Southern Mesic Slope Forest	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
ES	Floodplain Forest	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
ES	Near-coast Pine Flatwoods	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
ES	Ephemeral Ponds and Emergent Wetlands	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Wet Pine Savanna	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
ES	Seeps, Springs, and Seepage Swamps	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
ES	Herbaceous Seepage Bogs and Flats	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
ES	Canebrake	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
ES	Loblolly Pine Forest	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
ES	Slash Pine Forest	Distance from Roads	ORV Trail Density	Very High
			Unpaved Gated Road Density	Moderate
			Unpaved Open Road Density	High
SG	Species Sensitive to Soil Disturbance	Soil Productivity	Compliance with Soil Productivity Guidelines	Very High

Forest plan Components

Ecological system sustainability components include desired conditions for forestwide ecosystem diversity, all ecological systems, old-growth, and guidelines for vegetation/wildlife and water (Table G 82).

The following guidelines would apply to this species group:

- Best management practices (BMPs) should be used during ground disturbing activities.
- Erosion control measures should be applied in all ground disturbing activities to reduce movement of bare soil and minimize direct delivery of sediment to streams or other water bodies. Appropriate erosion control measures (install water diversion, re-vegetation, mulch, silt fence, etc.) should be implemented as promptly as practical.

- Construct and maintain water diversions along skid trails, haul roads, firelines or other disturbed areas susceptible to scour or erosion. Water diversions (water bars, dips, and lead off ditches) should be properly spaced to disperse runoff before it gains enough velocity to start eroding.
- Historical skid roads, haul roads, log landings, and mechanical firelines should be reused.
- Windrows and piles should be spaced less than 200 feet apart to limit soil exposure, soil compaction, and nutrient loss from piling and raking. Windrows should be aligned on the contour. When piling, at least 80 percent of the area should retain some ground cover of litter and duff, and soil displacement by piling rakes should be minimized.
- Mechanical site preparation exposing bare soil should not occur on slope grades greater than 20 percent.
- Mechanical equipment may operate as long as the soils are dry enough to sustain activity without excessive compaction or rutting. In order to minimize resource damage, access may be restricted during wet seasons or following rainfall events. This guideline does not apply to dedicated intensive use areas such as roads, primary skid trails, and logging decks. Ruts should be smoothed to restore hydrology and drainage paths.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include measures to provide protection for threatened and endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from ground disturbance.
- When creating wildlife food plots, they should be located outside of rare and wetland communities.
- Fireline and road locations should be assessed for the presence of species sensitive to soil disturbance prior to construction and adjusted to avoid impacts.

Management Strategies

Forest strategy for these species considered to be especially impacted by excavation or blading of roads and trails, compaction of soil, soil erosion, and soil sedimentation is to determine when a project has ground disturbing activities planned. Then the project should be reviewed to determine if these species do occur and develop mitigation measures. Implementation monitoring and use of guidelines are the management tools used in ensuring sustainability of these species.

G.3.5 Aquatic Systems

Rivers and Streams

Rivers and streams consist of all lotic (flowing-water) aquatic systems on the forest and include streamside riparian areas and ephemeral channels. Streamside riparian areas are used as buffers at the project level to protect watersheds from detrimental effects. These systems provide critical habitats for fish, mussels, invertebrates, reptiles, and amphibians. There is extensive acreage of this ecological system on the National Forests in Mississippi as they occur throughout the area.

Riparian zones are inseparably associated with upland forests and break up the upland areas with networks of bottomland forests (both pine and hardwoods). These riparian zones serve multiple ecological purposes. Riparian zones serve as natural filters for water borne sediments moving from the uplands and into the rivers and streams of the forest. Some species of plants and animals use riparian zones for completion of at least some phase of their life cycles, and aquatic species such as fish, some crayfish, and mussels are restricted to this zone.

Because of the fragmented ownership pattern, National Forest System lands often include only a small minority of the watershed (Table G 83). This restricted control limits the ability of the Forests to provide

for the sustainability of those communities and species in watersheds (or self-contained sub-watersheds). However, even these disjunctive tracts have unique ecological values because of the permanent forest cover which tends to create cool, clean, flowing waters when compared to adjacent landowners. Enhancement of water quality is a major goal of the National Forests in Mississippi, but the ability to do that is tempered by the percentage of surface area in National Forest System land.

Table G 83. Current condition watershed-wide (all ownerships), the percentage of National Forest System managed lands, and the Forests' relative management influence

Watershed Name	Current Condition	Percent NFS Lands	Relative Ability to Influence Watershed Health
Beaverdam Creek - Black Creek	Good	54.46	Very High
Hickory Creek - Black Creek	Very Good	50.84	Very High
Tuxachanie Creek - Tchoutacabouf	Good	47.22	Very High
Middle Fork Homochitto River	Very Good	35.19	Very High
Snow Creek - Tippah River	Good	33.08	High
Bluff Creek - Red Creek	Good	30.96	High
Quarterliah Creek - West Tallaha	Good	30.09	High
Little Thompson Creek - Thompson	Good	30.08	High
Tiger Creek - Bogue Homo	Good	28.11	High
Big Sunflower River - Little Sun	Good	27.51	High
Ichusa Creek - Leaf River	Good	25.87	High
Sand Creek - Noxubee River	Good	25.09	High
Maynor Creek - Big Creek	Good	23.69	High
Piney Woods Creek - Gaines Creek	Good	23.61	High
McCall Creek - Homochitto River	Good	19.50	Moderate
Raspberry Creek - Strong River	Good	19.15	Moderate
Mason Creek - Big Creek	Good	18.13	Moderate
Beaumont - Leaf River	Good	17.97	Moderate
Wells Creek - Homochitto River	Good	17.14	Moderate
Shelby Creek - Tippah River	Good	17.05	Moderate
Little Biloxi River - Biloxi Riv	Good	15.38	Moderate
Hatchapaloo Creek - Oakohay Creek	Good	14.80	Moderate
Big Cedar Creek - Pascagoula River	Good	14.70	Moderate
Shockaloo Creek - Tuscolameta Creek	Good	13.59	Moderate
Cypress Creek - Little Tallahatc	Good	12.47	Moderate
Silver Creek - Big Sunflower Riv	Good	11.66	Moderate
Leaf River - Atkinson Creek	Good	11.54	Low
Coffee Bogue - Pearl River	Good	9.98	Low
Flint Creek - Red Creek	Good	9.87	Low
Upper Chuquatonchee Creek	Good	9.42	Low
Cane Creek - Houlka Creek	Good	9.15	Low
Indian Creek - Wolf River	Good	8.87	Low
Byrd Creek - Chickasawhay River	Good	7.41	Low
Heidelberg - Bogue Homo	Good	5.78	Low

Watershed Name	Current Condition	Percent NFS Lands	Relative Ability to Influence Watershed Health
Bluff Creek - Moungers Creek	Good	5.76	Low
Burney Branch - Yocona River	Good	5.60	Low
Hurricane Creek - Muddy Creek	Good	5.59	Low
Persimmon Creek - Skuna River	Good	5.38	Low
Tillatoba Creek - Panola Quitman	Good	3.57	Very Low
Sipsey Creek - Tuscolameta Creek	Good	2.85	Very Low
Willis Creek - Little Bayou Pier	Good	2.40	Very Low
Sardis Lake - Little Tallahatchi	Good	2.38	Very Low
Little Black Creek - Black Creek	Good	1.91	Very Low
Cane Creek - Mud Creek	Good	1.81	Very Low
Bynum Creek - Yocona River	Good	1.67	Very Low
Porters Creek - Hatchie River	Good	1.53	Very Low
Collins Creek - Yazoo River	Good	1.30	Very Low
Upper Buffalo River	Very Good	0.89	Very Low
Tallabinnela Creek	Good	0.74	Very Low
Pelahatchie Creek	Good	0.67	Very Low
Lee Creek - Coldwater River	Good	0.51	Very Low
Middle Buffalo River	Very Good	0.44	Very Low
Foster Creek - Bayou Pierre	Good	0.33	Very Low
Cane Creek - Yalobusha River	Good	0.27	Very Low
West Fork Amite River	Good	0.16	Very Low
Tallahaga Creek	Good	0.16	Very Low
Crane Creek - Wolf River	Good	0.08	Very Low
Tibby Creek - Yockanookany River	Good	0.05	Very Low
Yellow Creek - Noxubee River	Good	0.04	Very Low
Woodland Creek - Beaver Creek	Good	0.01	Very Low

Lakes and Permanent Ponds

Lakes and permanent ponds consist of all lentic (still, impounded, or otherwise non-flowing) aquatic systems on the Forests, excluding the ecological system ponds and emergent wetlands which are discussed in their own section of this report. Many of the lakes on the Forests are man-made structures and support recreational activities. Oxbow lakes and sloughs are included within this system and consist of all water-bodies associated with floodplain aquatic ecosystems on the forest. These systems provide important habitats for fish, birds, mussels, invertebrates, reptiles, and amphibians. Lakes and permanent ponds occur on all units of the Forests.

Aquatic Species Associations

Species occurring in these groups require healthy watersheds and good water quality for survival. Implementation of streamside management zones and consideration of effects to water quality at the project level and management of riparian and floodplain forests should be sufficient to sustain these species.

An indicator for the sustainability of these groups is the relative amount of mature closed canopy floodplain forests. Other key factors of the sustainability of these species groups are included in the ecological sustainability evaluation. Table G 84 depicts 9 of the major factors evaluated and their associated ecological variables. Desired conditions require healthy and functioning watersheds. Guidelines established to follow best management practices, reduce impacts from sediment, use streamside management zones, and generally protect water quality should be sufficient to sustain these species.

Table G 84. Aquatic species groups and components

Aquatic Species Groups	Ecological Variables
Aquatic Coarse Woody Debris Associates	Rivers and Streams Healthy Watersheds Watershed-specific Planning Guidelines Riparian Forests Lakes and Ponds Lower Mississippi River Bottomland and Floodplain Forest Floodplain Forest
Open Water Associates	
Aquatic Species Sensitive to Modification of In-stream Flow	
Aquatic Species Sensitive to Non-native Invasive Species	
Aquatic Species Sensitive to Non-Point Source Pollution	
Aquatic Species Sensitive to Stream Sediment	
Aquatic Species Sensitive to Stream Toxins	
Aquatic Species Sensitive to Water Temperature Regime	
Species Sensitive to Recreational Traffic	

Aquatic Coarse Woody Debris Associates

These species (Table G 85) are dependent on quantities of coarse woody debris located in the stream or riparian area. Coarse woody debris plays a vital role in the life history for many of these species or their prey. Coarse woody debris is measured as a byproduct of a mature riparian area enclosing the stream. A sustainable amount of debris will enter the stream if the surrounding riparian area contains a mature, closed canopy forest with little or no unnatural disturbance. Trees and other woody debris should not be removed from streams unless it is for safety or transportation needs. If removed for transportation requirements, only those trees in the area adjacent to the road or causing direct impacts to roads, trails, or bridges should be removed.

Performance measures for tree age diversity and canopy structure for the riparian ecological systems serve as indicators for this species group (Table G 86). Both are at sustainable levels and are expected to remain sustainable in the future as long as guidelines established are followed. Forest plan components include desired conditions for floodplain forests and watershed health, objectives to maintain mature closed canopy forests in riparian areas, and guidelines for soil and water.

Table G 85. Species in aquatic coarse woody debris associates

Species Name	Common Name	Species-to-Group Weight
Alloperla natchez	Natchez Stonefly	Moderate
Anodontoides radiatus	Rayed Creekshell	Low
Etheostoma raneyi	Yazoo Darter	Moderate
Farancia erytrogramma	Rainbow Snake	Moderate
Haploperla chukcho	Chukcho Stonefly	Moderate
Lampsilis straminea straminea	Rough Fatmucket	Low
Lasmigona complanata complanata	White Heelsplitter	Low
Notropis melanostomus	Blackmouth Shiner	Moderate
Noturus gladiator	Piebald madtom	Moderate
Percina lenticula	Freckled Darter	Moderate
Plethobasus cyphyus	Sheepnose	Low
Pleurobema beadleianum	Mississippi Pigtoe	Low
Pleurobema rubrum	Pyramid Pigtoe	Low
Procambarus penni	Pearl Blackwater Crayfish	Moderate

Table G 86. Aquatic coarse woody debris associates key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Hydrologic Function	Compliance with Hydrologic Function Guidelines	Moderate
WS	Hydrologic Function	Dam Density Rating	Low
WS	Hydrologic Function	Riparian Road Density Rating	Moderate
WS	Hydrologic Function	Road Crossings Rating	Low
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Compliance with Sediment-related BMPs for Forest Management	Low
WS	Water Quality--Sediment	Compliance with Sediment-related BMPs for Roads Management	Low
WS	Water Quality--Sediment	Forest Cover Rating	High
WS	Water Quality--Sediment	Road Density Rating	Low
WS	Water Quality--Sediment	Sediment Risk Rating	Low
WS	Coarse Woody Debris Abundance	Compliance with Coarse Woody Debris Guidelines	Very High
ES	Coarse Woody Debris Abundance	% Riparian in Mature Forest	Very High

Open Water Associates

These species (Table G 87) require areas of open water. On National Forest System land, the largest bodies of water are often developed for various outdoor recreational activities. Open water surrounded by forest land may be a rare commodity and the National Forests in Mississippi provides opportunities for some species that are losing habitat elsewhere. Species needs should be incorporated into management of open areas with water, especially large lakes, ponds and rivers.

Abundance is the vital key factor for this species group. As the limiting factor for these species is the presence of extensive open bodies of water, Forest Service management should focus on maintaining quality and extent of existing habitat (Table G 88). If new opportunities become available to create habitat, these species should be considered in all planning processes. Desired conditions and objectives for lakes and permanent ponds, both floodplain ecological systems, and rivers and streams will help to sustain these species.

Table G 87. Species in open water associates

Species Name	Common Name	Species-to-Group Weight
Aix sponsa	Wood Duck	Moderate
Anas platyrhynchos	Northern Mallard	Moderate
Anas rubripes	American Black Duck	Moderate
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	Low
Haliaeetus leucocephalus	Bald Eagle	High
Myotis austroriparius	Southeastern Myotis	Low

Table G 88. Open water associates key attributes and indicators

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
SG	Open Water Associates	Habitat Type Abundance	Total Habitat Type Acres at Desired Condition	Very High
SG	Open Water Associates	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
SG	Open Water Associates	Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
SG	Open Water Associates	Invasive Species Abundance	Percent of Invasive Species Occupying System	High

Aquatic Species Sensitive to Modification of In-stream Flow

Species in this group (Table G 89) are sensitive to in-stream flow modifications which include channelization, dredging, dams, road crossings, and culverts. In many cases, hydrologic modification impedes or completely prevents natural migration and dispersal strategies. In other cases, hydrologic alteration may change water temperature regimes and water chemistry variables such as dissolved oxygen levels. Other more subtle impacts of hydrologic alteration include unnatural fluctuations in hydro period that may impede reproduction or other phases in the life history of associated species. Hydrologic function and water quality are very important attributes for this group (Table G 90).

Table G 89. Species in aquatic species sensitive to modification of in-stream flow

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Very High
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	Very High
Alosa alabamae	Alabama Shad	Very High
Ammocrypta meridiana	Southern Sand Darter	Very High
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	Very High
Crystallaria asprella	Crystal Darter	Very High
Etheostoma lachneri	Tombigbee Darter	Very High
Etheostoma raneyi	Yazoo Darter	Very High
Farancia erytrogramma	Rainbow Snake	Low
Haploperla chukcho	Chukcho Stonefly	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Lampsilis straminea straminea	Rough Fatmucket	High
Lasmigona complanata complanata	White Heelsplitter	Very High
Notropis melanostomus	Blackmouth Shiner	High
Noturus gladiator	piebald madtom	Very High
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High
Procambarus penni	Pearl Blackwater Crayfish	Low

Table G 90. Aquatic species sensitive to modification of in-stream flow key attributes and indicators

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Beaumont - Leaf River	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
			Dam Density Rating	Very High
			Road Crossings Rating	Very High
		Water Quality--Sediment	Compliance with Sediment-related BMPs for Forest Management	High
			Compliance with Sediment-related BMPs for Roads Management	High
			Sediment Risk Rating	High
		Coarse Woody Debris Abundance	Compliance with Coarse Woody Debris Guidelines	Moderate
SG	Species Sensitive to Modification of Instream Flow	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
			Dam Density Rating	Very High
			Riparian Road Density Rating	Very High
			Road Crossings Rating	Very High

Aquatic Species Sensitive to Non-native Invasive Species

Non-native invasive species negatively impact native communities in a number of ways. In some cases, invasives compete with native species for resources and space. Some invasive species may also prey directly upon native species. Still others may temporarily or even permanently alter habitats and community structures. The species in this association (Table G 91) are susceptible to competition, predation, displacement, and habitat alteration. Compliance with guidelines and management of invasive species are vital to these species (Table G 92).

Table G 91. Aquatic species sensitive to non-native invasive species

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Low
Actinonaias ligamentina	Mucket	Very High
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	Very High
Etheostoma lachneri	Tombigbee Darter	Low
Etheostoma raneyi	Yazoo Darter	Low
Isoetes louisianensis	Louisiana Quillwort	Very High
Lampsilis straminea straminea	Rough Fatmucket	Very High
Lasmigona complanata complanata	White Heelsplitter	Very High
Notropis melanostomus	Blackmouth Shiner	Low
Noturus gladiator	piebald madtom	Low
Nymphoides aquatica	Big Floating Heart	Very High
Nymphoides cordata	Floating Heart	Very High
Percina lenticula	Freckled Darter	Low
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High

Table G 92. Aquatic species sensitive to non-native invasive species key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High

Aquatic Species Sensitive to Non-Point Source Pollution

Urban and agricultural land uses generate a wide variety of toxins that often find their way into aquatic systems. While no one source may contribute large levels, when aggregated at the watershed scale, these toxins may alter water chemistry to a detrimental extent. Species in this association (Table G 93) are highly susceptible to alterations in water chemistry resulting from high levels of urban and agricultural land uses in a given watershed. Runoff from non-forested land uses can accumulate to levels toxic to species in this association. Compliance with guidelines and water quality are vital to these species (Table G 94).

Table G 93. Aquatic species sensitive to non-point source pollution

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Very High
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	Very High
Alosa alabamae	Alabama Shad	Very High
Ammocrypta meridiana	Southern Sand Darter	Very High
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	Very High
Crystallaria asprella	Crystal Darter	Very High
Etheostoma lachneri	Tombigbee Darter	Very High
Etheostoma raneyi	Yazoo Darter	Very High
Farancia erytrogramma	Rainbow Snake	Very High
Haploperla chukcho	Chukcho Stonefly	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Lampsilis straminea straminea	Rough Fatmucket	Moderate
Lasmigona complanata complanata	White Heelsplitter	Very High
Notropis melanostomus	Blackmouth Shiner	Very High
Noturus gladiator	piebald madtom	Very High
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High
Procambarus penni	Pearl Blackwater Crayfish	Very High

Table G 94. Aquatic species sensitive to non-point source pollution key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Forest Cover Rating	Very High
WS	Water Quality--Toxics	Non-Point Source Rating	Very High
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Forest Cover Rating	Very High
WS	Water Quality--Toxics	Non-Point Source Rating	Very High

Aquatic Species Sensitive to Stream Sediment

Suspended sediments may adversely impact respiration and other biological functions necessary to the survival of some species (Table G 95) in this association. As heavier sediments settle to stream bottoms, important foraging and spawning habitat may also degrade. Excessive deposits of sediment may disrupt photosynthesis in some plant species or even completely bury occurrences. Water quality and hydrologic function are vital to these species and were included in the ecological sustainability evaluation model (Table G 96).

Table G 95. Aquatic species sensitive to stream sediment

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Very High
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	Very High
Alosa alabamae	Alabama Shad	Very High
Ammocrypta meridiana	Southern Sand Darter	Moderate
Crystallaria asprella	Crystal Darter	Very High
Etheostoma lachneri	Tombigbee Darter	Very High
Etheostoma raneyi	Yazoo Darter	Very High
Farancia erytrogramma	Rainbow Snake	Moderate
Haploperla chukcho	Chukcho Stonefly	Very High
Isoetes louisianensis	Louisiana Quillwort	High
Lampsilis straminea straminea	Rough Fatmucket	Low
Lasmigona complanata complanata	White Heelsplitter	Moderate
Myriophyllum laxum	Loose Watermilfoil	Very High
Notropis melanostomus	Blackmouth Shiner	Moderate
Noturus gladiator	piebald madtom	Moderate
Nymphoides aquatica	Big Floating Heart	High
Nymphoides cordata	Floating Heart	High
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High

Table G 96. Aquatic species sensitive to stream sediment key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
WS	Hydrologic Function	Dam Density Rating	Low
WS	Hydrologic Function	Riparian Road Density Rating	Very High
WS	Hydrologic Function	Road Crossings Rating	Very High
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Compliance with Sediment-related BMPs for Forest Management	Very High
WS	Water Quality--Sediment	Compliance with Sediment-related BMPs for Roads Management	Very High
WS	Water Quality--Sediment	Forest Cover Rating	High
WS	Water Quality--Sediment	Road Density Rating	High
WS	Water Quality--Sediment	Sediment Risk Rating	Very High

Aquatic Species Sensitive to Stream Toxins

Unlike non-point source pollution, species in this association (Table G 97) are especially susceptible to point source pollution. While permitted point sources may not adversely impact this group when compliant, spills, discharges, and other accidents may precipitate spikes in stream toxin levels sufficient to extirpate entire occurrences. Extreme alterations in water chemistry from any source can be highly detrimental to these species along thuse were key attributes in the ecological sustainability evaluation model (Table G 98).

Table G 97. Aquatic species sensitive to stream toxins

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Very High
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	Very High
Alosa alabamae	Alabama Shad	Very High
Ammocrypta meridiana	Southern Sand Darter	Very High
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	Very High
Crystallaria asprella	Crystal Darter	Very High
Etheostoma lachneri	Tombigbee Darter	Very High
Etheostoma raneyi	Yazoo Darter	Very High
Farancia erytrogramma	Rainbow Snake	Very High
Haploperla chukcho	Chukcho Stonefly	Very High
Lampsilis straminea straminea	Rough Fatmucket	Very High
Lasmigona complanata complanata	White Heelsplitter	Very High
Notropis melanostomus	Blackmouth Shiner	Very High
Noturus gladiator	piebald madtom	Very High
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High
Procambarus penni	Pearl Blackwater Crayfish	Very High

Table G 98. Aquatic species sensitive to stream toxins key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Hydrologic Function	Riparian Road Density Rating	Very High
WS	Hydrologic Function	Road Crossings Rating	Very High
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Forest Cover Rating	High
WS	Water Quality--Sediment	Road Density Rating	High
WS	Water Quality--Toxics	Non-Point Source Rating	Very High
WS	Water Quality--Toxics	Point Source Rating	Very High

Aquatic Species Sensitive to Water Temperature Regime

These species (Table G 99) are highly dependent on specific water temperature regimes for all or part of their life history. Thermal alteration most often occurs when riparian areas are deforested exposing water surface to increased levels of direct sunlight. Other sources of thermal alteration, such as accidental industrial discharge, are much rarer and usually temporary. Key attributes used in the ecological sustainability evaluation model are included in Table G 100.

Table G 99. Aquatic species sensitive to water temperature regime

Species Name	Common Name	Species-to-Group Weight
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	Very High
Alosa alabamae	Alabama Shad	Moderate
Ammocrypta meridiana	Southern Sand Darter	High
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	High
Etheostoma lachneri	Tombigbee Darter	Very High
Etheostoma raneyi	Yazoo Darter	Very High
Farancia erytrogramma	Rainbow Snake	Low
Haploperla chukcho	Chukcho Stonefly	Very High
Lampsilis straminea straminea	Rough Fatmucket	Very High
Lasmigona complanata complanata	White Heelsplitter	High
Notropis melanostomus	Blackmouth Shiner	Very High
Noturus gladiator	piebald madtom	Very High
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High
Procambarus penni	Pearl Blackwater Crayfish	High

Table G 100. Aquatic species sensitive to water temperature regime key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
ES	Forest Age Diversity	% Mature Forest	High
ES	Forest Age Diversity	% Old Forest	High
ES	Vegetation Structure	% Mature Very-Closed Canopy	Very High
WS	Hydrologic Function	Dam Density Rating	High
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Forest Cover Rating	High

Species Sensitive to Recreational Traffic

Species in this group (Table G 101) are sensitive to excessive human disturbance such as trampling, harassment, vehicular mortality, excessive collection, breeding or nest disturbance, and direct mortality. Many species are collected commercially and used for a variety of purposes including food, medicinal, decorative, gardening/landscaping, pet trade, bait collection, and trophy fishing. Reptile species are especially sensitive to being harmed, harassed, and killed by humans. This interaction with humans can have long-term negative effects on population sizes and sustainability.

Collection limits for fishable/ hunt able and non-game species are set by Mississippi Department of Wildlife, Fisheries, and Parks, so issues of excessive take are beyond Forest Service control. However, we should explore opportunities to limit access to areas with sensitive populations of these species when feasible. The strategy for these species is to continue to educate the public on species needs, restrict access to known populations, and limit approval of collections of these species to scientific purposes only. Key attributes used in the ecological sustainability evaluation model are included in Table G 102.

Table G 101. Species sensitive to recreational traffic

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Very High
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	High
Alosa alabamae	Alabama Shad	Moderate
Ammocrypta meridiana	Southern Sand Darter	Moderate
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	Very High
Etheostoma lachneri	Tombigbee Darter	Moderate
Etheostoma raneyi	Yazoo Darter	Moderate
Farancia erytrogramma	Rainbow Snake	Very High
Haploperla chukcho	Chukcho Stonefly	High
Lampsilis straminea straminea	Rough Fatmucket	Very High
Lasmigona complanata complanata	White Heelsplitter	Very High
Myriophyllum laxum	Loose Watermilfoil	Low
Notropis melanostomus	Blackmouth Shiner	Moderate
Noturus gladiator	piebald madtom	Very High
Nymphoides aquatica	Big Floating Heart	Moderate
Nymphoides cordata	Floating Heart	Moderate
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High
Procambarus penni	Pearl Blackwater Crayfish	Moderate

Table G 102. Species sensitive to recreational traffic key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Hydrologic Function	Riparian Road Density Rating	Very High
WS	Hydrologic Function	Road Crossings Rating	Very High
WS	Water Quality--Sediment	Road Density Rating	Very High
SG	Distance from Roads	ORV Trail Density	Very High
SG	Distance from Roads	Paved Open Road Density	Very High
SG	Distance from Roads	Total Road and Trail Density	Very High
SG	Distance from Roads	Unpaved Gated Road Density	Very High
SG	Distance from Roads	Unpaved Open Road Density	Very High

G.4 Crosswalk between NatureServe's Ecological Systems and Forest Service Forest Types

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
Bienville		
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Water and Alluvial
	61-swamp.chest.oak-cherrybark	All
	62-sweetgum-nut.oak-willow	
	63-sugarberry-a.elm-greenash	
	64-laureloak-willowoak	
	98-undrained flatwoods	
	46-bottmhardwoods-yellowpine	
East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest and Woodland	12-shortleaf pine – oak	
	32-shortleaf pine	
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland	21-longleaf pine	
East Gulf Coastal Plain Jackson Prairie and Woodland	35-e.red cedar	Prairie
Southern Mesic Slope Forest	47-w.oak-b.oak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	51-postoak-blackoak	
	53-w.oak-n.redoak-hickory	
	54-whiteoak	
	56-y.poplar-w.oak-n.red.oak	All
	58-sweet gum - y.poplar	
	69-beech-magnolia	
Southern Loblolly-Hardwood Flatwoods	13-loblolly pine - hardwood	Mesic
	31-loblolly pine	Adanton, Faulkner, Ichusa, Louin, and Oktibbeha Soil series

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
Successional and Planted Loblolly Pine Forest	13-loblolly pine - hardwood	Xeric, Dry, Dry-mesic, and Prairie
	31-loblolly pine	All soil series except Adanton, Faulkner, Ichusa, Louin, and Oktibbeha soil series
Southern Coastal Plain Dry Upland Hardwood Forest	44-s.redoak-yellowpine	All
	47-w.oak-b.oak-yellowpine	Xeric, Dry, Dry-mesic, and Prairie
	51-postoak-blackoak	
	53-w.oak-n.redoak-hickory	
	54-whiteoak	
Southern Coastal Plain Seepage Swamp and Baygall (includes forested seeps)	68-s.bay-swamptupelo-r.maple	All
Chickasawhay		
Administrative Site	99 - administrative	All
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Water, Alluvial, and Non-riverine Hydric
	46-bottmhardwoods-yellowpine	All
	61-swamp.chest.oak-cherrybark	
	62-sweetgum-nut.oak-willow	
	64-laureloak-willowoak	
	98-undrained flatwoods	
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland	12-shortleaf pine - oak	
	21-longleaf pine	
	25-yellow pine	
	32-shortleaf pine	
	49-bearoak-s.scrubo-yellowpine	
	57-scrub oak	
East Gulf Coastal Plain Southern Mesic Slope Forest	13-loblolly pine - hardwood	Mesic
	47-w.oak-b.oak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	48-n.redoak-hickory-yellowpine	
	50-yellow poplar	All
	53-w.oak-n.redoak-hickory	Mesic, Alluvial, and Non-riverine Hydric
	54-whiteoak	
	56-y.poplar-w.oak-n.red.oak	All
	58-sweet gum - y.poplar	
	69-beech-magnolia	

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
Loblolly Pine Forest	13-loblolly pine - hardwood	Xeric, Dry, and Dry-mesic
	31-loblolly pine	All
Slash Pine Forest	14-slash pine - hardwood	
	22-slash pine	
Southern Coastal Plain Dry Upland Hardwood Forest	44-s.redoak-yellowpine	
	47-w.oak-b.oak-yellowpine	Xeric, Dry, and Dry-mesic
	48-n.redoak-hickory-yellowpine	
	51-postoak-blackoak	All
	53-w.oak-n.redoak-hickory	Xeric, Dry, and Dry-mesic
	54-whiteoak	
Southern Coastal Plain Seepage Swamp and Baygall	68-s.bay-swamptupelo-r.maple	All
Xeric Sandhills	Not applicable	Xeric
De Soto		
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Water, Alluvial, and Non-riverine Hydric
	24-baldcypress	All
	67-bald cypress-water tupelo	
	61-swamp.chest.oak-cherrybark	
	62-sweetgum-nut.oak-willow	
	64-laureloak-willowoak	
	98-undrained flatwoods	
	46-bottmhardwoods-yellowpine	Water, Alluvial, and Non-riverine Hydric
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland	12-shortleaf pine - oak	All
	21-longleaf pine	All except Non-riverine Hydric
	25-yellow pine	
	26-longleaf pine - hardwood	
	32-shortleaf pine	All
	49-bearoak-s.scrubo-yellowpine	
	57-scrub oak	
East Gulf Coastal Plain Near Coast Pine Flatwoods	14-slash pine - hardwood	Non-riverine Hydric
	21-longleaf pine	
	22-slash pine	
	25-yellow pine	
	26-longleaf pine - hardwood	
	99-brush species	All

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
East Gulf Coastal Plain Southern Mesic Slope Forest	13-loblolly pine - hardwood	Mesic
	37-spruce pine	All
	47-w.oak-b.oak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	48-n.redoak-hickory-yellowpine	
	50-yellow poplar	All
	53-w.oak-n.redoak-hickory	Mesic, Alluvial, and Non-riverine Hydric
	54-whiteoak	
	56-y.poplar-w.oak-n.red.oak	All
	58-sweet gum - y.poplar	
	69-beech-magnolia	
East Gulf Coastal Plain Treeless Savanna and Wet Prairie	Not applicable	Non-riverine Hydric
Loblolly Pine Forest	13-loblolly pine - hardwood	Xeric, Dry, and Dry-mesic
	31-loblolly pine	All
	46-bottmhardwoods-yellowpine	Xeric, Dry, Dry-mesic, and Mesic
Slash Pine Forest	14-slash pine - hardwood	All except Non-riverine Hydric
	22-slash pine	
Southern Coastal Plain Dry Upland Hardwood Forest	44-s.redoak-yellowpine	All
	47-w.oak-b.oak-yellowpine	Xeric, Dry, and Dry-mesic
	48-n.redoak-hickory-yellowpine	
	51-postoak-blackoak	All
	53-w.oak-n.redoak-hickory	Xeric, Dry, and Dry-mesic
	54-whiteoak	
	97-live oak	All
Southern Coastal Plain Herbaceous Seepage Bog	Land class code 251(restored) and 832 (need restoration)	
Southern Coastal Plain Seepage Swamp and Baygall	68-s.bay-swamptupelo-r.maple	
Xeric Sandhills	Not applicable	Xeric
Delta		
Lower Mississippi River Bottomland and Floodplain Forest	62-sweetgum-nut.oak-willow	All
	63-sugarberry-a.elm-greenash	
	65-overcup oak-water hickory	
	73-cottonwood	
	74-willow	
Holly Springs		
Cypress Dominated Wetland	24-baldcypress	All
	67-bald cypress-water tupelo	

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Alluvial
	46-bottmhardwoods-yellowpine	All
	61-swamp.chest.oak-cherrybark	
	62-sweetgum-nut.oak-willow	
	63-sugarberry-a.elm-greenash	
	64-laureloak-willowoak	
	72-river birch-sycamore	
	75-sycamore-pecan-a.elm	
	98-undrained flatwoods	
East Gulf Coastal Plain Northern Seepage Swamp	68-s.bay-swamptupelo-r.maple	
East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest and Woodland	12-shortleaf pine - oak	
	25-yellow pine	
	32-shortleaf pine	
	33-virginia pine	
East Gulf Coastal Plain Northern Depression Pondshore	99 - brush species	
East Gulf Coastal Plain Northern Dry Upland Hardwood Forest	44-s.redoak-yellowpine	Xeric, Dry, Upland Loess, Prairie, Dry-mesic
	45-chestoak-scarletoak-yellowpine	All
	47-w.oak-b.oak-yellowpine	Xeric, Dry, Upland Loess, Prairie, Dry-mesic
	48-n.redoak-hickory-yellowpine	
	49-bearoak-s.scrubo-yellowpine	All
	51-postoak-blackoak	All
	53-w.oak-n.redoak-hickory	Xeric, Dry, Upland Loess, Prairie, Dry-mesic
	54-whiteoak	
East Gulf Coastal Plain Northern Mesic Hardwood Forest	13-loblolly pine - hardwood	Mesic
	44-s.redoak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	47-w.oak-b.oak-yellowpine	
	48-n.redoak-hickory-yellowpine	
	53-w.oak-n.redoak-hickory	
	54-whiteoak	
	56-y.poplar-w.oak-n.red.oak	All
	58-sweet gum - y.poplar	
	82-black walnut	
Slash Pine Forest	22- slash pine	
Loblolly Pine Forest	13-loblolly pine - hardwood	All except Alluvial and Mesic
	31-loblolly pine	All

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
Homochitto		
Cypress Dominated Wetland	67-bald cypress-water tupelo	All
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Alluvial
	37-spruce pine	All
	46-bottmhardwoods-yellowpine	All
	61-swamp.chest.oak-cherrybark	All except Loess
	62-sweetgum-nut.oak-willow	All
	63-sugarberry-a.elm-greenash	
	64-laureloak-willowoak	
	71-b.ash-a.elm-r.maple	
	72-river birch-sycamore	
	74-willow	
	98- undrained flatwoods	
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland	12-shortleaf pine - oak	
	21-longleaf pine	
	25-yellow pine	
	26-longleaf pine - hardwood	
	32-shortleaf pine	
East Gulf Coastal Plain Southern Loess Bluff Forest	53-w.oak-n.redoak-hickory	Loess
	54-whiteoak	
	58-sweet gum - y.poplar	
	61-swamp.chest.oak-cherrybark	
	69-beech-magnolia	
East Gulf Coastal Plain Southern Mesic Slope Forest	13-loblolly pine - hardwood	Mesic
	47-w.oak-b.oak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	48-n.redoak-hickory-yellowpine	
	50-yellow poplar	All
	53-w.oak-n.redoak-hickory	Mesic, Alluvial, and Non-riverine Hydric
	54-whiteoak	
	56-y.poplar-w.oak-n.red.oak	All
	58-sweet gum - y.poplar	All except Loess
	69-beech-magnolia	
Loblolly Pine Forest	13-loblolly pine - hardwood	All except Alluvial and Mesic
	31-loblolly pine	All
Southern Coastal Plain Dry Upland Hardwood Forest	44-s.redoak-yellowpine	
	45 - chestnut oak-scarlet oak-yellow pine	
	47-w.oak-b.oak-yellowpine	Xeric, Dry, Upland Loess, and Dry-mesic
	48-n.redoak-hickory-yellowpine	
	53-w.oak-n.redoak-hickory	Xeric, Dry, and Dry-mesic
	54-whiteoak	
	88-black locust	All

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
Southern Coastal Plain Seepage Swamp and Baygall	68-s.bay-swamptupelo-r.maple	
Tombigbee		
East Gulf Coastal Plain Black Belt Calcareous Prairie and Woodland	11-eastern red cedar - hardwood	All
	35-e.red cedar	
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Alluvial and Water
	46-bottmhardwoods-yellowpine	All
	61-swamp.chest.oak-cherrybark	
	62-sweetgum-nut.oak-willow	
	63-sugarberry-a.elm-greenash	
	64-laureloak-willowoak	
	68-s.bay-swamptupelo-r.maple	
	73-cottonwood	
	74-willow	
	75-sycamore-pecan-a.elm	
	98-undrained flatwoods	
	99-brush species	
East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest and Woodland	12-shortleaf pine - oak	
	32-shortleaf pine	
East Gulf Coastal Plain Northern Dry Upland Hardwood Forest	43-oak-e.redcedar	
	44-s.redoak-yellowpine	
	47-w.oak-b.oak-yellowpine	Xeric, Dry, Loess, Blackbelt Prairie, and Dry-mesic
	48-n.redoak-hickory-yellowpine	
	51-postoak-blackoak	All
	53-w.oak-n.redoak-hickory	Xeric, Dry, Loess, Blackbelt Prairie, and Dry-mesic
East Gulf Coastal Plain Northern Mesic Hardwood Forest	13-loblolly pine - hardwood	Mesic
	47-w.oak-b.oak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	48-n.redoak-hickory-yellowpine	
	53-w.oak-n.redoak-hickory	
	55-red oak	All
	56-y.poplar-w.oak-n.red.oak	
	58-sweet gum - y.poplar	
	69-beech-magnolia	
Loblolly Pine Forest	13-loblolly pine - hardwood	All except Alluvial and Mesic
	31-loblolly pine	All
Slash Pine Forest	22-slash pine	All

G.5 Ecological Site Type Definitions

Ecological site types are predominately defined by soil drainage classes. Following are definitions of each ecological site type followed by a list of which soil series are included in the type on each district.

Xeric –

Represented by somewhat excessively well-drained and excessively well-drained soil drainage characteristics occurring on the National Forests in Mississippi. This site type is equivalent to Gopher Tortoise priority soils on the Chickasawhay and De Soto NFs.

Soil Name	Locations
Eustis and Lakeland loamy sands, 0-8 percent slopes	Chickasawhay / De Soto
Eustis and Lakeland soils, 15-30 percent slopes	Chickasawhay / De Soto
Eustis and Lakeland soils, 8-15 percent slopes	Chickasawhay / De Soto
Lakeland sand	Bienville
Wadley fine sand, 0-8 percent slopes	Chickasawhay / De Soto

Dry –

Represented by well-drained soil drainage characteristics occurring on the National Forests in Mississippi.

Soil Name	Locations
Atwood silt loam	Holly Springs / Tombigbee
Benndale and Heidel soils, 8-15 percent slopes	Chickasawhay / De Soto
Cahaba fine sandy loam	Holly Springs / Tombigbee/ Bienville
Cahaba sandy loam	Homochitto
Gullied land-Smithdale complex	Holly Springs / Tombigbee
Heidel fine sandy loam	Bienville
Heidel sandy loam, 15-30 percent slopes	Chickasawhay / De Soto
Lexington silt loam, 8-17% slopes	Holly Springs / Tombigbee
Lucy and Wadley soils	Holly Springs / Tombigbee
Lucy loamy sand	Homochitto
Maben fine sandy loam and Sweatman silt lo	Holly Springs / Tombigbee
Maben loam and Sweatman fine sandy loam	Holly Springs / Tombigbee
Maben silt loam and Sweatman silt loam	Holly Springs / Tombigbee
McLaurin and Benndale fine sandy loams, 0-8 percent slopes	Chickasawhay / De Soto
Ruston and Lucedale soils, 0-8 percent slopes	Chickasawhay / De Soto
Shubuta fine sandy loam, 8-12 percent slopes	Chickasawhay / De Soto
Smithdale and Ruston soils	Holly Springs / Tombigbee
Smithdale fine sandy loam	Bienville /Holly Springs / Tombigbee
Smithdale fine sandy loam, 15-35 percent slopes, eroded	Chickasawhay / De Soto
Smithdale fine sandy loam, 8-15 percent slopes, eroded	Chickasawhay / De Soto

Soil Name	Locations
Smithdale-Rock outcrop sandstone cx	Bienville
Sweatman fine sandy loam	Bienville
Saffell Gravelly Fine Sandy Loam	All compartments on Homochitto except: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244
Ruston Fine Sandy Loam	Bienville and all compartments on Homochitto except: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244
Smithdale Sandy Loam	Holly Springs, Tombigbee, and all compartments on Homochitto except: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244

Upland Loess –

Represented by loess soils occurring on the National Forests in Mississippi.

Soil Name	Locations
Calloway-Grenada complex	Holly Springs / Tombigbee
Gullied land - Loring Complex	Holly Springs / Tombigbee
Gullied land-Providence complex	Holly Springs / Tombigbee
Lexington silt loam, 2-8 % slopes	Holly Springs / Tombigbee
Lexington Silt Loam, Eroded	Homochitto
Loring Silt Loam, 0-8% slopes	Homochitto
Loring silt loam, 2-8 % slopes	Holly Springs / Tombigbee
Memphis Silt Loam, Eroded	Homochitto
Ruston Fine Sandy Loam	Homochitto: Compartments: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244
Saffell Gravelly Fine Sandy Loam	Homochitto: Compartments: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244
Smithdale Sandy Loam	Homochitto: Compartments: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244

Prairie –

Represented by well-drained alkaline prairie soils occurring on the National Forests in Mississippi.

Soil Name	Locations
Demopolis silty clay loam	Tombigbee
Gullied land-Demopolis complex	Tombigbee
Maytag silty clay	Bienville
Okolona silty clay	Bienville

Dry-Mesic –

Represented by moderately well-drained soil drainage characteristics occurring on the National Forests in Mississippi.

Soil Name	Locations
Boswell fine sandy loam	Bienville
Demopolis silty clay loam	Holly Springs
Freest fine sandy loam	Bienville
Freest fine sandy loam, 0-8 percent slopes	Chickasawhay / De Soto
Freest-Susquehanna Complex, 5-12 percent slopes	Chickasawhay / De Soto
Gullied land-Demopolis complex	Holly Springs
Kolin silt loam, eroded	Homochitto
Loring silt loam, 8-17 % slopes	Holly Springs / Tombigbee
Lorman Silt Loam	Homochitto
Lorman silt loam, 15-40 percent slopes	Chickasawhay / De Soto
Ora fine sandy loam	Bienville
Ora loam	Holly Springs
Ora sandy loam	Holly Springs / Tombigbee
Petal fine sandy loam, 8-20 percent slopes	Chickasawhay / De Soto
Poarch, Malbis and Saucier soils, 0-8 percent slopes	Chickasawhay / De Soto
Prentiss fine sandy loam, 0-5 percent slopes	Chickasawhay / De Soto /Holly Springs / Tombigbee
Providence silt loam, 8-15 % slopes	Holly Springs / Tombigbee
Savannah fine sandy loam	Bienville /Holly Springs / Tombigbee
Savannah fine sandy loam, 0-5 percent slopes	Chickasawhay / De Soto
Providence silt loam, 0-8% slopes	Holly Springs / Tombigbee
Providence silt loam, 0-8% slopes	Homochitto

Mesic –

Represented by somewhat poorly-drained soil drainage characteristics occurring on the National Forests in Mississippi.

Soil Name	Locations
Bude Silt Loam	Homochitto
Escambia and Basin soils, 0-3 percent slopes	Chickasawhay / De Soto
Falkner silt loam	Bienville
Falkner silt loam, 0-3 percent slopes	Chickasawhay / De Soto
Ichusa silty clay loam	Bienville
Kipling loam	Holly Springs / Tombigbee
Kipling silt loam	Holly Springs / Tombigbee
Lenoir silt loam, 0-2 percent slopes	Chickasawhay / De Soto
Louin silty clay loam	Bienville
Nahunta silt loam, 0-2 percent slopes	Chickasawhay / De Soto
Oktibbeha silty clay loam	Bienville
Stough fine sandy loam	Bienville
Susquehanna fine sandy loam, 2-8 percent slopes	Chickasawhay / De Soto
Susquehanna fine sandy loam, 8-15 percent slopes, eroded	Chickasawhay / De Soto
Wilcox silt loam	Holly Springs / Tombigbee

Non-riverine hydric –

Represented by very poorly-drained and poorly-drained soil drainage characteristics occurring on the National Forests in Mississippi.

Soil Name	Locations
Adaton silt loam	Bienville
Atmore, Plummer and Smithton soils, 0-2 percent slopes	Chickasawhay / De Soto

Alluvial –

Represented by alluvial / floodplain soils are occasionally flooded or frequently flooded occurring on the National Forests in Mississippi.

Soil Name	Locations
Annemaine loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Ariel Silt Loam, Occasionally Flooded	Homochitto
Belden and Leeper silty clay loams	Holly Springs / Tombigbee
Bibb fine sandy loam fq fld	Bienville
Bibb, Trebloc and Leaf soils, 0-2 percent slopes, frequently flooded	Chickasawhay / De Soto
Bigbee loamy sand, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Bruno Sandy Loam, Frequently Flooded	Homochitto

Soil Name	Locations
Cahaba, Latonia and Bassfield soils, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Cascilla and Jena soils	Holly Springs / Tombigbee
Chenneby and Mathiston silt loams	Holly Springs / Tombigbee
Collins Silt Loam, occasionally flooded	Homochitto
Dorovan and Pamlico soils, 0-2 percent slopes, frequently flooded	Chickasawhay / De Soto
Falaya Silt Loam, Occasionally Flooded	Homochitto
Gillsburg and Mantachie soils	Holly Springs / Tombigbee
Gillsburg Silt Loam, Occasionally Flooded	Homochitto
Guyton loam occasionally flooded	Bienville
Harleston fine sandy loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Houlka silty clay loam occasionally flooded	Bienville
Iuka sandy loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Jena fine sandy loam occasionally flooded	Bienville
Kirkville fine sandy loam occasionally flooded	Bienville
Leeper clay loam occasionally flooded	Bienville
Lenoir silt loam, 0-2 percent slopes, frequently flooded	Chickasawhay / De Soto
Mantachie sandy loam 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Mantachie silt loam occasionally flooded	Bienville
Marietta fine sandy loam	Holly Springs / Tombigbee
Marietta silt loam occasionally flooded	Bienville
Nugent loamy sand, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Oaklimeter and Collins silt loams	Holly Springs / Tombigbee
Ochlockonee and Jena sandy loams, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Ochlockonee-Kirkville complex	Holly Springs / Tombigbee
Quitman fine sandy loam occasionally flooded	Bienville
Riverwash	Homochitto
Stough fine sandy loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Trebloc Silt Loam, Frequently Flooded	Homochitto
Typic Fluvaquents	Holly Springs / Tombigbee
Urbo and Una soils fq fld	Bienville
Urbo silty clay loam occasionally flooded	Bienville

Water –

Represented by standing water, wet spots, or ponded areas occurring on the Forests. This excludes streams, rivers, or other lotic bodies of water.

G.5.1 Relative Abundance Matrix

Spatial extent (relative abundance) was important to provide insight into possible restoration objectives. Relative abundance is defined as the percentage of each ecological site type covered by each ecological system. We examined current relative abundance, based upon our FSVeg and soils data, and ecologically sustainable relative abundance as designed by the best available science and natural historic range of variation. Desired relative abundance may take several decades to achieve. The relative abundance matrix uses the ecological site types as defined above to display the ecologically optimal percentage of each system on all units.

The following table was created using ecological sustainability evaluation tool. It compares the current relative abundance with the ecologically sustainable relative abundance and provides a sustainability score. The scores were determined by setting thresholds for each ecological system on each ecological site type. For example, on the Ackerman Unit of the Tombigbee NF, floodplain forests should comprise no more than 5 percent of dry site types. The thresholds in this example would be as follows:

Poor	Fair	Good	Very Good
>10	5-10	1-5	0

Scores of good or very good indicate sustainable ecological systems. For most systems a range of sustainable coverage was determined. The table below is grouped by national forest unit. This was necessary due to the diversity of soil site types across the Forests.

Table G 103. Soil relative abundance matrix

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Ackerman Unit						
	Dry (well drained soils)			**Dry to Mesic (moderately well-drained)**		
Floodplain Forest	0-5	1	Very Good	0-5	1	Very Good
Loblolly Pine Forest	0-5	55	Poor	0-5	71	Poor
Northern Dry Upland Hardwood Forest	40-60	29	Poor	40-60	13	Poor
Northern Mesic Hardwood Forest	0-5	3	Very Good	0-5	1	Very Good
Shortleaf Pine-Oak Forest and Woodland	40-60	12	Poor	40-60	14	Poor
Slash Pine Forest	0-5	0	Very Good	0-5	0	Very Good
	Upland Loess			**Mesic (somewhat poorly drained)**		
Floodplain Forest	0-5	0	Very Good	0-5	0	Very Good
Loblolly Pine Forest	0-5	80	Poor	0-5	48	Poor
Northern Dry Upland Hardwood Forest	40-60	14	Poor	0-5	0	Very Good
Northern Mesic Hardwood Forest	0-5	2	Very Good	80-100	37	Poor

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Shortleaf Pine-Oak Forest and Woodland	40-60	4	Poor	1-20	15	Very Good
Slash Pine Forest	0-5	0	Very Good	0-5	0	Very Good
	Alluvial (floodplain)			**Water or Ponded Areas**		
Floodplain Forest	90-100	13	Poor	90-100	0	Poor
Loblolly Pine Forest	0-5	38	Poor	0-5	49	Poor
Northern Dry Upland Hardwood Forest	0-5	1	Very Good	0-5	0	Very Good
Northern Mesic Hardwood Forest	0-5	40	Poor	0-5	50	Poor
Shortleaf Pine-Oak Forest and Woodland	0-5	7	Fair	0-5	1	Very Good
Slash Pine Forest	0-5	1	Very Good	0-5	0	Very Good
Trace Unit						
	Black Belt Prairie Soils			**Dry (well drained soils)**		
Black Belt Prairie and Woodland	90-100	43	Poor	0-5	0	Very Good
Floodplain Forest	0-5	1	Very Good	0-5	1	Very Good
Loblolly Pine Forest	0-5	38	Poor	0-5	47	Poor
Northern Dry Upland Hardwood Forest	0-5	14	Fair	40-60	22	Poor
Northern Mesic Hardwood Forest	0-5	1	Very Good	0-5	10	Fair
Shortleaf Pine-Oak Forest and Woodland	0-5	3	Very Good	40-60	20	Poor
Slash Pine Forest	0-5	0	Very Good	0-5	0	Very Good
	Dry to Mesic (moderately well-drained)			**Mesic (somewhat poorly drained)**		
Black Belt Prairie and Woodland	0-5	0	Very Good	0-5	1	Very Good
Floodplain Forest	0-5	8	Fair	0-5	1	Very Good
Loblolly Pine Forest	0-5	75	Poor	0-5	62	Poor
Northern Dry Upland Hardwood Forest	40-60	11	Poor	0-5	1	Very Good
Northern Mesic Hardwood Forest	0-5	2	Very Good	90-100	31	Poor
Shortleaf Pine-Oak Forest and Woodland	40-60	4	Poor	0-5	4	Very Good
Slash Pine Forest	0-5	0	Very Good	0-5	1	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
	Alluvial (floodplain)			**Water**		
Black Belt Prairie and Woodland	0-5	2	Very Good	0-5	5	Very Good
Floodplain Forest	90-100	13	Poor	90-100	8	Poor
Loblolly Pine Forest	0-5	48	Poor	0-5	11	Fair
Northern Dry Upland Hardwood Forest	0-5	8	Fair	0-5	0	Very Good
Northern Mesic Hardwood Forest	0-5	28	Poor	0-5	65	Poor
Shortleaf Pine-Oak Forest and Woodland	0-5	1	Very Good	0-5	11	Fair
Slash Pine Forest	0-5	0	Very Good	0-5	0	Very Good
Bienville Unit						
	Xeric (excessively well-drained)			**Prairie Soils**		
Floodplain Forest	0-5	0	Very Good	0-5	23	Fair
Jackson Prairie and Woodland	0-5	0	Very Good	90-100	7	Poor
Loblolly Pine Forest	0-5	100	Poor	0-5	65	Poor
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	0-5	0	Very Good	0-5	2	Very Good
Southern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	3	Very Good
Southern Mesic Slope Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Loblolly-Hardwood Flatwoods	0-5	0	Very Good	0-5	0	Very Good
Upland Longleaf Pine Woodland	90-100	0	Poor	0-5	0	Very Good
	Dry (well drained soils)			**Dry to Mesic (moderately well-drained)**		
Floodplain Forest	0-5	2	Very Good	0-5	5	Very Good
Jackson Prairie and Woodland	0-5	0.1	Very Good	0-5	0	Very Good
Loblolly Pine Forest	0-5	75	Poor	0-5	79	Poor
Seeps, Springs, and Seepage Swamps	0.1-1	0.2	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	1-20	7.7	Very Good	0-5	4	Very Good
Southern Dry Upland Hardwood Forest	0-5	5	Very Good	0-5	4	Very Good
Southern Mesic Slope Forest	0-5	1	Very Good	0-5	1	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Southern Loblolly-Hardwood Flatwoods	0-5	0	Very Good	0-5	0	Very Good
Upland Longleaf Pine Woodland	79-99	9	Poor	90-100	7	Poor
	Mesic (somewhat poorly drained)			**Non-Riverine Hydric (poorly drained**		
Floodplain Forest	0-5	4	Very Good	10-20	12	Good
Jackson Prairie and Woodland	0-5	0	Very Good	0-5	0	Very Good
Loblolly Pine Forest	0-5	2	Very Good	0-5	1	Very Good
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	1-5	3	Very Good	0-5	3	Very Good
Southern Dry Upland Hardwood Forest	0-5	1	Very Good	0-5	1	Very Good
Southern Mesic Slope Forest	10-20	12	Good	5-15	7	Good
Southern Loblolly-Hardwood Flatwoods	70-80	79	Very Good	70-80	76	Very Good
Upland Longleaf Pine Woodland	0-5	0	Very Good	0-5	0	Very Good
	Alluvial (floodplain)			**Water / Wet Spot**		
Floodplain Forest	90-100	50	Poor	90-100	67	Poor
Jackson Prairie and Woodland	0-5	0	Very Good	0-5	0	Very Good
Loblolly Pine Forest	0-5	17	Fair	0-5	11	Fair
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	0-5	1	Very Good	0-5	4	Very Good
Southern Dry Upland Hardwood Forest	0-5	1	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	0-5	31	Poor	0-5	18	Fair
Southern Loblolly-Hardwood Flatwoods	0-5	0	Very Good	0-5	0	Very Good
Upland Longleaf Pine Woodland	0-5	0	Very Good	0-5	0	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Chickasawhay Unit						
	Xeric (excessively well-drained)			**Dry (well drained soils)**		
Floodplain Forest	0-5	4	Very Good	0-5	5	Very Good
Herbaceous Seepage Bog and Flats		Data Need			Data Need	
Loblolly Pine Forest	0-5	29	Poor	0-5	19	Fair
Seeps, Springs, and Seepage Swamps	0-5	0.2	Very Good	0-5	1	Very Good
Slash Pine Forest	0-5	25	Fair	0-5	24	Fair
Southern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	1	Very Good
Southern Mesic Slope Forest	0-5	0	Very Good	0-5	1	Very Good
Upland Longleaf Pine Woodland	90-100	42	Poor	90-100	49	Poor
	Dry to Mesic (moderately well-drained)			**Mesic (somewhat poorly drained)**		
Floodplain Forest	0-5	3	Very Good	0-5	4	Very Good
Herbaceous Seepage Bog and Flats		Data Need			Data Need	
Loblolly Pine Forest	0-5	12	Fair	0-5	11	Fair
Seeps, Springs, and Seepage Swamps	0-5	1	Very Good	0-5	1	Very Good
Slash Pine Forest	0-5	35	Poor	0-5	31	Poor
Southern Dry Upland Hardwood Forest	0-5	1	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	0-5	0	Very Good	0-5	3	Very Good
Upland Longleaf Pine Woodland	90-100	48	Poor	90-100	50	Poor
	Alluvial (floodplain)			**Water**		
Floodplain Forest	80-100	43	Poor	80-100	34	Poor
Herbaceous Seepage Bog and Flats		Data Need			Data Need	
Loblolly Pine Forest	0-5	17	Fair	0-5	13	Fair
Seeps, Springs, and Seepage Swamps	1-10	2	Very Good	1-10	4	Very Good
Slash Pine Forest	0-5	19	Fair	0-5	19	Fair
Southern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	0-5	3	Very Good	0-5	5	Very Good
Upland Longleaf Pine Woodland	0-5	16	Fair	0-5	25	Fair

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
De Soto Unit						
	Xeric (excessively well-drained)			**Dry (well drained soils)**		
Floodplain Forest	0-5	2	Very Good	0-5	1	Very Good
Herbaceous Seepage Bog and Flats	0.1-2	0.2	Very Good	0.1-2	0.3	Very Good
Loblolly Pine Forest	0-5	19	Fair	0-5	14	Fair
Near-Coast Pine Flatwoods	0-5	0	Very Good	0-5	0	Very Good
Seeps, Springs, and Seepage Swamps	1-5	5	Very Good	0-5	6	Fair
Slash Pine Forest	0-5	22	Fair	0-5	16	Fair
Southern Dry Upland Hardwood Forest	0-5	2	Very Good	0-5	2	Very Good
Southern Mesic Slope Forest	0-5	0	Very Good	0-5	1	Very Good
Wet Pine Savanna	0-5	0	Very Good	0-5	0	Very Good
Upland Longleaf Pine Woodland	90-98.9	50	Poor	90-99.9	60	Poor
	Dry to Mesic (moderately well-drained)			**Mesic (somewhat poorly drained)**		
Floodplain Forest	0-5	0	Very Good	0-5	2	Very Good
Herbaceous Seepage Bog and Flats	0.1-4	2	Very Good	0.1-2	1	Very Good
Loblolly Pine Forest	0-5	8	Fair	0-5	15	Fair
Near-Coast Pine Flatwoods	0-5	0	Very Good	0-5	0	Very Good
Seeps, Springs, and Seepage Swamps	0-5	2	Very Good	1-5	4	Very Good
Slash Pine Forest	0-5	34	Poor	0-5	19	Fair
Southern Dry Upland Hardwood Forest	0-5	1	Very Good	0-5	1	Very Good
Southern Mesic Slope Forest	0-5	0	Very Good	10-30	5	Fair
Wet Pine Savanna	0-5	0	Very Good	0-5	0	Very Good
Upland Longleaf Pine Woodland	90-99.9	53	Poor	65-85	53	Poor
	Non-riverine Hydric (poorly drained)			**Alluvial (floodplain)**		
Floodplain Forest	0-5	13	Fair	40-60	42	Good
Herbaceous Seepage Bog and Flats	3-13	6	Very Good	0.1-2	1	Very Good
Loblolly Pine Forest	0-5	5	Very Good	0-5	14	Fair
Near-Coast Pine Flatwoods	50-70	67	Good	0-5	0	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Seeps, Springs, and Seepage Swamps	2-11	8	Very Good	10-30	15	Very Good
Slash Pine Forest	0-5	0	Very Good	5-15	27	Poor
Southern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	0-5	1	Very Good	0-5	4	Very Good
Wet Pine Savanna	10-30	0	Poor	0-5	0	Very Good
Upland Longleaf Pine Woodland	0-5	0	Very Good	0-5	15	Fair
	Water					
Floodplain Forest	70-89.9	58	Poor			
Herbaceous Seepage Bog and Flats	0.1-2	1	Very Good			
Loblolly Pine Forest	0-5	7	Fair			
Near-Coast Pine Flatwoods	1-20	11	Very Good			
Seeps, Springs, and Seepage Swamps	1-20	7	Very Good			
Slash Pine Forest	0-5	0	Very Good			
Southern Dry Upland Hardwood Forest	0-5	0	Very Good			
Southern Mesic Slope Forest	0-5	4	Very Good			
Wet Pine Savanna	0-5	0	Very Good			
Upland Longleaf Pine Woodland	0-5	12	Fair			
Delta Unit						
	Permanently Wet			**Seasonally Wet**		
Lower Mississippi River Bottomland and Floodplain Forest	100	100	Very Good	100	100	Very Good
	Semi-permanently Wet			**Temporarily Wet**		
Lower Mississippi River Bottomland and Floodplain Forest	100	100	Very Good	100	100	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Holly Springs Unit						
	Dry (well drained soils)			**Dry to Mesic (moderately well-drained)**		
Cypress Dominated Wetlands	0-5	0	Very Good	0-5	0	Very Good
Floodplain Forest	0-5	1	Very Good	0-5	1	Very Good
Loblolly Pine Forest	0-5	40	Poor	0-5	44	Poor
Northern Dry Upland Hardwood Forest	40-60	27	Poor	40-60	14	Poor
Northern Mesic Hardwood Forest	0-5	4	Very Good	0-5	1	Very Good
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	40-60	28	Poor	40-60	40	Good
	Upland Loess			**Mesic (somewhat poorly drained)**		
Cypress Dominated Wetlands	0-5	0	Very Good	0-5	0	Very Good
Floodplain Forest	0-5	0	Very Good	0-5	0	Very Good
Loblolly Pine Forest	0-5	43	Poor	0-5	32	Poor
Northern Dry Upland Hardwood Forest	40-60	17	Poor	0-5	0	Very Good
Northern Mesic Hardwood Forest	0-5	4	Very Good	60-80	46	Poor
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	40-60	36	Fair	20-40	22	Good
	Alluvial (floodplain)			**Water**		
Cypress Dominated Wetlands	1-15	1	Very Good	90-100	0	Poor
Floodplain Forest	40-60	12	Poor	0-5	0	Very Good
Loblolly Pine Forest	0-5	22	Fair	0-5	0	Very Good
Northern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	0	Very Good
Northern Mesic Hardwood Forest	30-50	46	Good	0-5	87	Poor
Seeps, Springs, and Seepage Swamps	1-5	1	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	0-5	18	Fair	0-5	13	Fair

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Yalobusha Unit						
	Dry (well drained soils)			**Dry to Mesic (moderately well-drained)**		
Floodplain Forest	0-5	1	Very Good	0-5	1	Very Good
Loblolly Pine Forest	0-5	60	Poor	0-5	77	Poor
Northern Dry Upland Hardwood Forest	40-60	28	Poor	40-60	11	Poor
Northern Mesic Hardwood Forest	0-5	5	Very Good	0-5	4	Very Good
Shortleaf Pine-Oak Forest and Woodland	40-60	4	Poor	40-60	6	Poor
Slash Pine Forest	0-5	2	Very Good	0-5	1	Very Good
	Upland Loess			**Alluvial (floodplain)**		
Floodplain Forest	0-5	1	Very Good	75-95	6	Poor
Loblolly Pine Forest	0-5	84	Poor	0-5	48	Poor
Northern Dry Upland Hardwood Forest	40-60	7	Poor	0-5	0	Very Good
Northern Mesic Hardwood Forest	0-5	2	Very Good	5-25	43	Poor
Shortleaf Pine-Oak Forest and Woodland	40-60	2	Poor	0-5	2	Very Good
Slash Pine Forest	0-5	4	Very Good	0-5	1	Very Good
	Water or Ponded Areas					
Floodplain Forest	90-100	1	Poor			
Loblolly Pine Forest	0-5	84	Poor			
Northern Dry Upland Hardwood Forest	0-5	0	Very Good			
Northern Mesic Hardwood Forest	0-5	15	Fair			
Shortleaf Pine-Oak Forest and Woodland	0-5	0	Very Good			
Slash Pine Forest	0-5	0	Very Good			

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Homochitto Unit						
	Dry (well drained soils)			**Dry to Mesic (moderately well-drained)**		
Cypress Dominated Wetlands	0-5	0	Very Good	0-5	0	Very Good
Floodplain Forest	0-5	2	Very Good	0-5	2	Very Good
Loblolly Pine Forest	0-5	84	Poor	0-5	82	Poor
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Southern Dry Upland Hardwood Forest	0-10	4	Good	0-10	2	Good
Southern Loess Bluff Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	0-5	1	Very Good	0-5	1	Very Good
Upland Longleaf Pine Woodland	90-100	9	Poor	90-100	13	Poor
	Upland Loess			**Mesic (somewhat poorly drained)**		
Cypress Dominated Wetlands	0-5	0	Very Good	0-5	0	Very Good
Floodplain Forest	0-5	5	Very Good	0-5	12	Fair
Loblolly Pine Forest	0-5	62	Poor	0-5	62	Poor
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Southern Dry Upland Hardwood Forest	30-50	10	Poor	0-5	1	Very Good
Southern Loess Bluff Forest	30-50	16	Poor	0-5	0	Very Good
Southern Mesic Slope Forest	10-30	6	Fair	80-99	24	Poor
Upland Longleaf Pine Woodland	0-5	1	Very Good	1-20	1	Good
	Alluvial (floodplain)			**Water or Ponded Areas**		
Cypress Dominated Wetlands	1-5	2	Very Good	15-25	17	Good
Floodplain Forest	75-95	37	Poor	65-85	28	Poor
Loblolly Pine Forest	0-5	44	Poor	0-5	41	Poor
Seeps, Springs, and Seepage Swamps	1-5	1	Very Good	1-8	7	Very Good
Southern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Loess Bluff Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	5-15	12	Very Good	0-5	7	Fair
Upland Longleaf Pine Woodland	0-5	4	Very Good	0-5	0	Very Good

G.6 Species for which there is no known or potential occurrence based upon suitable habitat on the National Forests in Mississippi (Not evaluated further)

Taxa	Scientific Name	Common Name
Amphibian	*Gyrinophilus porphyriticus*	Spring Salamander
Amphibian	*Plethodon ventralis*	Southern Zigzag Salamander
Amphibian	*Pseudacris brachyphona*	Mountain Chorus Frog
Aquatic Invertebrate	*Cambarellus diminutus*	Least Crayfish
Aquatic Invertebrate	*Cambarellus lesliei*	A Crayfish
Aquatic Invertebrate	*Cambarus girardianus*	A Crayfish
Aquatic Invertebrate	*Cambarus latimanus*	A Crayfish
Aquatic Invertebrate	*Hobbseus attenuatus*	Pearl Rivulet Crayfish
Aquatic Invertebrate	*Hobbseus cristatus*	A Crayfish
Aquatic Invertebrate	*Hobbseus orconectoides*	Oktibbeha Rivulet Crayfish
Aquatic Invertebrate	*Hobbseus petilus*	Tombigbee Rivulet Crayfish
Aquatic Invertebrate	*Hobbseus yalobushensis*	A Crayfish
Aquatic Invertebrate	*Homoeoneuria cahabensis*	Cahaba Sand-filtering Mayfly
Aquatic Invertebrate	*Orconectes etnieri*	A Crayfish
Aquatic Invertebrate	*Orconectes hartfieldi*	A Crayfish
Aquatic Invertebrate	*Orconectes jonesi*	A Crayfish
Aquatic Invertebrate	*Orconectes mississippiensis*	A Crayfish
Aquatic Invertebrate	*Orconectes validus*	A Crayfish
Aquatic Invertebrate	*Orconectes virilis*	Virile Crayfish
Aquatic Invertebrate	*Procambarus ablusus*	A Crayfish
Aquatic Invertebrate	*Procambarus bivittatus*	Ribbon Crayfish
Aquatic Invertebrate	*Procambarus cometes*	Mississippi Flatwoods Crayfish
Aquatic Invertebrate	*Procambarus connus*	Carrollton Crayfish
Aquatic Invertebrate	*Procambarus elegans*	A Crayfish
Aquatic Invertebrate	*Procambarus hagenianus vesticeps*	A Crayfish
Aquatic Invertebrate	*Procambarus lagniappe*	Lagniappe Crayfish
Aquatic Invertebrate	*Procambarus lecontei*	Mobile Crayfish
Aquatic Invertebrate	*Procambarus lylei*	Shutispear Crayfish
Aquatic Invertebrate	*Procambarus shermani*	A Crayfish
Bird	*Ammodramus maritimus*	Seaside Sparrow
Bird	*Ammodramus nelsoni*	Nelson's Sharp-tailed Sparrow
Bird	*Anas fulvigula*	Mottled Duck
Bird	*Calidris mauri*	Western Sandpiper
Bird	*Charadrius alexandrinus tenuirostris*	Southeastern Snowy Plover
Bird	*Charadrius wilsonia*	Wilson's Plover
Bird	*Egretta rufescens*	Reddish Egret
Bird	*Falco columbarius*	Merlin
Bird	*Haematopus palliatus*	American Oystercatcher

Taxa	Scientific Name	Common Name
Bird	*Rynchops niger*	Black Skimmer
Bird	*Sterna maxima*	Royal Tern
Bird	*Sterna nilotica*	Gull-billed Tern
Bird	*Sterna sandvicensis*	Sandwich Tern
Bird	*Tyrannus dominicensis*	Gray Kingbird
Bird	*Tyrannus forficatus*	Scissor-tailed Flycatcher
Crustacean	*Fallicambarus burrisi*	Burris' Burrowing Crawfish
Fish	*Ambloplites rupestris*	Rock Bass
Fish	*Ammocrypta clara*	Western Sand Darter
Fish	*Clinostomus funduloides*	Rosyside Dace
Fish	*Cottus carolinae*	Banded Sculpin
Fish	*Cyprinella callistia*	Alabama Shiner
Fish	*Cyprinella galactura*	Whitetail Shiner
Fish	*Cyprinella spiloptera*	Spotfin Shiner
Fish	*Enneacanthus gloriosus*	Bluespotted Sunfish
Fish	*Etheostoma blennioides*	Greenside Darter
Fish	*Etheostoma duryi*	Black Darter
Fish	*Etheostoma flabellare*	Fantail Darter
Fish	*Etheostoma kennicotti*	Stripetail Darter
Fish	*Etheostoma nigripinne*	Blackfin Darter
Fish	*Etheostoma rufilineatum*	Redline Darter
Fish	*Etheostoma zonifer*	Backwater Darter
Fish	*Fundulus dispar*	Northern Starhead Topminnow
Fish	*Fundulus euryzonus*	Broadstripe Topminnow
Fish	*Fundulus jenkinsi*	Saltmarsh Topminnow
Fish	*Heterandria formosa*	Least Killifish
Fish	*Ichthyomyzon castaneus*	Chestnut Lamprey
Fish	*Leptolucania ommata*	Pygmy Killifish
Fish	*Lythrurus fasciolaris*	Rosefin Shiner
Fish	*Macrhybopsis gelida*	Sturgeon Chub
Fish	*Macrhybopsis meeki*	Sicklefin Chub
Fish	*Moxostoma anisurum*	Silver Redhorse
Fish	*Moxostoma carinatum*	River Redhorse
Fish	*Moxostoma duquesnei*	Black Redhorse
Fish	*Moxostoma macrolepidotum*	Shorthead Redhorse
Fish	*Notropis boops*	Bigeye Shiner
Fish	*Notropis candidus*	Silverside Shiner
Fish	*Notropis chalybaeus*	Ironcolor Shiner
Fish	*Notropis edwardraneyi*	Fluvial Shiner
Fish	*Notropis rubellus*	Rosyface Shiner
Fish	*Notropis sabinae*	Sabine Shiner
Fish	*Notropis wickliffi*	Channel Shiner

Taxa	Scientific Name	Common Name
Fish	*Noturus exilis*	Slender Madtom
Fish	*Noturus flavus*	Stonecat
Fish	*Noturus munitus*	Frecklebelly Madtom
Fish	*Percina evides*	Gilt Darter
Fish	*Percina kathae*	Mobile Logperch
Fish	*Percina phoxocephala*	Slenderhead Darter
Fish	*Phoxinus erythrogaster*	Southern Redbelly Dace
Fish	*Platygobio gracilis*	Flathead Chub
Fish	*Rhinichthys atratulus*	Blacknose Dace
Fish	*Scaphirhynchus platorynchus*	Shovelnose Sturgeon
Fish	*Stizostedion canadense*	Sauger
Fish	*Stizostedion sp 1*	Southern Walleye
Fish	*Stizostedion vitreum*	Walleye
Mammal	*Lasionycteris noctivagans*	Silver-haired Bat
Mussel	*Cyclonaias tuberculata*	Purple Wartyback
Mussel	*Cyprogenia aberti*	Western Fanshell
Mussel	*Elliptio arca*	Alabama Spike
Mussel	*Elliptio dilatata*	Spike
Mussel	*Epioblasma triquetra*	Snuffbox
Mussel	*Fusconaia barnesiana*	Tennessee Pigtoe
Mussel	*Lampsilis hydiana*	Louisiana Fatmucket
Mussel	*Lasmigona complanata alabamensis*	Alabama Heelsplitter
Mussel	*Lexingtonia dolabelloides*	Slabside Pearlymussel
Mussel	*Ligumia recta*	Black Sandshell
Mussel	*Medionidus mcglameriae*	Tombigbee Moccasinshell
Mussel	*Potamilus alatus*	Pink Heelsplitter
Mussel	*Ptychobranchus fasciolaris*	Kidneyshell
Mussel	*Quadrula metanevra*	Monkeyface
Mussel	*Quadrula rumphiana*	Ridged Mapleleaf
Mussel	*Strophitus connasaugaensis*	Alabama Creekmussel
Mussel	*Strophitus undulatus*	Squawfoot
Mussel	*Uniomerus obesus*	Southern Pondhorn
Reptile	*Graptemys nigrinoda*	Black-knobbed Map Turtle
Reptile	*Lampropeltis getula nigra*	Black Kingsnake
Reptile	*Malaclemys terrapin pileata*	Mississippi Diamondback Terrapin
Reptile	*Nerodia clarkii clarkii*	Gulf Salt Marsh Snake
Reptile	*Pituophis melanoleucus melanoleucus*	Northern Pine Snake
Reptile	*Regina septemvittata*	Queen Snake
Terrestrial Invertebrate	*Gastrocopta abbreviata*	Plains Snaggletooth
Terrestrial Invertebrate	*Gryllotalpa major*	Prairie Mole Cricket
Vascular Plant	*Adiantum capillus-veneris*	Southern Maidenhair-fern

Taxa	Scientific Name	Common Name
Vascular Plant	*Agalinis homalantha*	San Antonio False-foxglove
Vascular Plant	*Amsonia ludoviciana*	Louisiana Bluestar
Vascular Plant	*Aplectrum hyemale*	Puttyroot
Vascular Plant	*Arabis lyrata*	Dwarf Rockcress
Vascular Plant	*Arabis patens*	Spreading Rockcress
Vascular Plant	*Aristida spiciformis*	Pine Barren Three-awned Grass
Vascular Plant	*Asplenium resiliens*	Black-stem Spleenwort
Vascular Plant	*Asplenium rhizophyllum*	Walking-fern Spleenwort
Vascular Plant	*Aster pratensis*	Barrens Silky Aster
Vascular Plant	*Aster prenanthoides*	Crooked-stem aster
Vascular Plant	*Athyrium pycnocarpon*	Glade Fern
Vascular Plant	*Avicennia nitida*	Black Mangrove
Vascular Plant	*Bidens coronata*	Golden Flowered Beggar Tick
Vascular Plant	*Burmannia biflora*	Northern Burmannia
Vascular Plant	*Calopogon multiflorus*	Many-flower Grass-pink
Vascular Plant	*Canna flaccida*	Golden Canna
Vascular Plant	*Carex gracilescens*	Slender Sedge
Vascular Plant	*Carex jamesii*	Nebraska Sedge
Vascular Plant	*Carex seorsa*	Separated Sedge
Vascular Plant	*Carex striata*	Walter's Sedge
Vascular Plant	*Carex tenax*	A Sedge
Vascular Plant	*Carex verrucosa*	Warty Sedge
Vascular Plant	*Castilleja coccinea*	Scarlet Indian-paintbrush
Vascular Plant	*Chamaecrista deeringiana*	Florida Senna
Vascular Plant	*Cheilanthes alabamensis*	Alabama Lipfern
Vascular Plant	*Cladium mariscoides*	Twig Rush
Vascular Plant	*Cladrastis kentukea*	Yellowwood
Vascular Plant	*Clematis glaucophylla*	White-leaved Leather-flower
Vascular Plant	*Coelorachis cylindrica*	Pitted Jointgrass
Vascular Plant	*Conradina canescens*	Seaside Balm
Vascular Plant	*Cooperia drummondii*	Evening Rainlily
Vascular Plant	*Coreopsis auriculata*	Lobed Tickseed
Vascular Plant	*Coreopsis nudata*	Georgia Tickseed
Vascular Plant	*Crataegus brachyacantha*	Blueberry Hawthorn
Vascular Plant	*Cypripedium kentuckiense*	Southern Lady's-slipper
Vascular Plant	*Dirca palustris*	Eastern Leatherwood
Vascular Plant	*Echinacea pallida*	Pale Purple Coneflower
Vascular Plant	*Eleocharis elongata*	Slim Spikerush
Vascular Plant	*Eleocharis equisetoides*	Horse-tail Spikerush
Vascular Plant	*Eleocharis rostellata*	Beaked Spikerush
Vascular Plant	*Elyonurus tripsacoides*	Pan American Balsamscale
Vascular Plant	*Erythrodes querceticola*	Low Erythrodes

Taxa	Scientific Name	Common Name
Vascular Plant	*Euphorbia inundata*	Florida Pine Spurge
Vascular Plant	*Eustoma exaltatum*	Tall Prairie-gentain
Vascular Plant	*Evax prolifera*	Bighead Pygmycudweed
Vascular Plant	*Gentiana catesbaei*	Elliot's Gentian
Vascular Plant	*Glyceria arkansana*	Arkansas Manna-grass
Vascular Plant	*Gratiola brevifolia*	Sticky Hedge-hyssop
Vascular Plant	*Gutierrezia dracunculoides*	Broom Snakeroot
Vascular Plant	*Gymnocladus dioicus*	Kentucky Coffee-tree
Vascular Plant	*Helianthemum arenicola*	Gulf Rockrose
Vascular Plant	*Herbertia lahue ssp caerulea*	Herbertia
Vascular Plant	*Hibiscus coccineus*	Brilliant Hibiscus
Vascular Plant	*Hottonia inflata*	Featherfoil
Vascular Plant	*Hydrastis canadensis*	Golden Seal
Vascular Plant	*Hydrophyllum appendiculatum*	Appendaged Waterleaf
Vascular Plant	*Hypericum myrtifolium*	Myrtle-leaved St. Johnswort
Vascular Plant	*Ilex cassine*	Dahoon Holly
Vascular Plant	*Ipomoea pes-caprae*	Railroad Vine
Vascular Plant	*Juncus filipendulus*	Texas Plains Rush
Vascular Plant	*Juniperus silicicola*	Southern Red Cedar
Vascular Plant	*Lesquerella gracilis*	Spreading Bladder-pod
Vascular Plant	*Ligusticum canadense*	Nondo Lovage
Vascular Plant	*Lilaeopsis carolinensis*	Carolina Lilaeopsis
Vascular Plant	*Lilium michiganense*	Michigan Lily
Vascular Plant	*Linum sulcatum*	Grooved Yellow Flax
Vascular Plant	*Lobelia boykinii*	Boykin's Lobelia
Vascular Plant	*Ludwigia alata*	Winged Seedbox
Vascular Plant	*Lycium carolinianum*	Carolina Wolf-berry
Vascular Plant	*Lycopus amplectens*	Sessile-leaved Bugleweed
Vascular Plant	*Magnolia tripetala*	Umbrella Magnolia
Vascular Plant	*Marshallia tenuifolia*	Narrow-leaf Barbara's Button
Vascular Plant	*Mitreola angustifolium*	Narrowleaf Miterwort
Vascular Plant	*Nemastylis geminiflora*	Prairie Iris
Vascular Plant	*Neviusia alabamensis*	Alabama Snow-wreath
Vascular Plant	*Oenothera triloba*	Prairie Evening-primrose
Vascular Plant	*Paronychia erecta*	Beach Sand-squares
Vascular Plant	*Paspalum monostachyum*	Gulfdune Paspalum
Vascular Plant	*Perideridia americana*	Eastern Eulophus
Vascular Plant	*Phacelia dubia*	Small-flower Scorpionweed
Vascular Plant	*Phaseolus sinuatus*	Sandhill Bean
Vascular Plant	*Physalis angustifolia*	Coast Ground-cherry
Vascular Plant	*Physalis arenicola*	Cypress-head Ground-cherry
Vascular Plant	*Pieris phyillyreifolia*	Climbing Fetterbush

Taxa	Scientific Name	Common Name
Vascular Plant	*Pinguicula pumila*	Dwarf Butterwort
Vascular Plant	*Pinus clausa*	Sand Pine
Vascular Plant	*Platanthera integrilabia*	White Fringeless orchid
Vascular Plant	*Polanisia tenuifolia*	Slender-leaf Clammy-weed
Vascular Plant	*Polygala crenata*	Crenate Milkwort
Vascular Plant	*Pycnanthemum setosum*	Awned Mountainmint
Vascular Plant	*Quercus palustris*	Pin Oak
Vascular Plant	*Rhododendron arborescens*	Smooth Azalea
Vascular Plant	*Rhynchospora cephalantha var attenuata*	Capitate Beakrush
Vascular Plant	*Rhynchospora curtissii*	Curtiss's Beakrush
Vascular Plant	*Rhynchospora decurrens*	Swamp-forest Beakrush
Vascular Plant	*Rhynchospora fernaldii*	Fernald's Beakrush
Vascular Plant	*Rhynchospora globularis var pinetorum*	Small's Beakrush
Vascular Plant	*Rhynchospora harperi*	Harper Beakrush
Vascular Plant	*Rhynchospora tracyi*	Tracy's Beakrush
Vascular Plant	*Rosa foliolosa*	White Prairie Rose
Vascular Plant	*Sageretia minutiflora*	Tiny-leaved Buckthorn
Vascular Plant	*Sapindus marginatus*	Florida Soapberry
Vascular Plant	*Sarracenia leucophylla*	Crimson Pitcherplant
Vascular Plant	*Sarracenia rosea*	Rose Pitcherplant
Vascular Plant	*Sarracenia rubra ssp wherryi*	Wherry's Pitcherplant
Vascular Plant	*Schizachyrium maritimum*	Gulf Bluestem
Vascular Plant	*Sedum pulchellum*	Rock Stonecrop
Vascular Plant	*Setaria corrugata*	Coastal Fox-tail
Vascular Plant	*Spiranthes lacera*	Northern Slender Ladies'-tresses
Vascular Plant	*Taenidia integerrima*	Yellow Pimpernell
Vascular Plant	*Tiarella cordifolia*	Heart-leaved Foam-flower
Vascular Plant	*Trillium ludovicianum*	Louisiana Trillium
Vascular Plant	*Trillium pusillum*	Least Trillium
Vascular Plant	*Vaccinium tenellum*	Gale-leaf Blueberry
Vascular Plant	*Viola pubescens var eriocarpon*	Smooth Yellow Violet
Vascular Plant	*Xyris louisianica*	Louisiana Yellow-eyed Grass
Vascular Plant	*Yeatesia viridiflora*	Green-flower Yeatesia

G.7 Threatened and endangered species removed from the National Forests in Mississippi list due to no known occurrence

Taxa	Scientific Name	Common Name
Bird	*Charadrius melodus*	Piping Plover
Bird	*Pelecanus occidentalis*	Brown Pelican
Bird	*Sterna antillarum*	Least Tern
Bird	*Sterna antillarum athalassos*	Interior Least Tern
Bird	*Vermivora bachmanii*	Bachman's Warbler
Fish	*Etheostoma rubrum*	Bayou Darter
Fish	*Scaphirhynchus suttkusi*	Alabama Sturgeon
Mammal	*Myotis grisescens*	Gray Myotis
Mammal	*Puma concolor coryi*	Florida Panther
Mammal	*Trichechus manatus*	Manatee
Mussel	*Epioblasma brevidens*	Cumberlandian Combshell
Mussel	*Epioblasma penita*	Southern Combshell
Mussel	*Lampsilis perovalis = Hamiota perovalis*	Orange-nacre Mucket
Mussel	*Medionidus acutissimus*	Alabama Moccasinshell
Mussel	*Pleurobema curtum*	Black Clubshell
Mussel	*Pleurobema decisum*	Southern Clubshell
Mussel	*Pleurobema marshalli*	Flat Pigtoe
Mussel	*Pleurobema perovatum*	Ovate Clubshell
Mussel	*Pleurobema taitianum*	Heavy Pigtoe
Mussel	*Potamilus capax*	Fat Pocketbook
Mussel	*Potamilus inflatus*	Inflated Heelsplitter
Mussel	*Quadrula stapes*	Stirrupshell
Plant	*Apios priceana*	Price's Potato Bean
Plant	*Schwalbea americana*	Chaffseed
Reptile	*Caretta caretta*	Loggerhead Seaturtle
Reptile	*Chelonia mydas*	Green Seaturtle
Reptile	*Dermochelys coriacea*	Leatherback Seaturtle
Reptile	*Drymarchon corais couperi*	Eastern Indigo Snake
Reptile	*Eretmochelys imbricata*	Hawksbill Seaturtle
Reptile	*Graptemys flavimaculata*	Yellow-blotched Map Turtle
Reptile	*Graptemys oculifera*	Ringed Map Turtle
Reptile	*Lepidochelys kempii*	Kemp's Ridley
Reptile	*Pseudemys alabamensis*	Alabama Redbellied Turtle
Terrestrial Invertebrate	*Nicrophorus americanus*	American Burying Beetle
Terrestrial Invertebrate	*Neonympha mitchellii*	Mitchell’s Satyr

G.8 Regional forester sensitive species analyzed for the National Forests in Mississippi

Taxa	Common Name	Scientific Name	Global Rank	Confirmed Occurrence	rationale for selection / non-selection
Amphibian	One-toed Amphiuma	*Amphiuma pholeter*	G3	N	occurrence not confirmed (1)
Amphibian	Webster's Salamander	*Plethodon websteri*	G3	Y	forest plan components will be developed
Bird	Bachman's Sparrow	*Aimophila aestivalis*	G3	Y	
Bird	Bald Eagle	*Haliaeetus leucocephalus*	G4	Y	
Crustacean	Speckled Burrowing Crayfish	*Fallicambarus danielae*	G2	Y	
Crustacean	Camp Shelby Burrowing Crayfish	*Fallicambarus gordoni*	G1	Y	
Crustacean	Pearl Rivulet Crayfish	*Hobbseus attenuatus*	G2	N	occurrence not confirmed (1)
Crustacean	Jackson Prairie Crayfish	*Procambarus barbiger*	G2	Y	forest plan components will be developed
Crustacean	Spiny-tailed Crayfish	*Procambarus fitzpatricki*	G2	Y	
Crustacean	Pearl Blackwater Crayfish	*Procambarus penni*	G3	Y	forest plan components not needed (5)
Fish	Alabama Shad	*Alosa alabamae*	G3	Y	
Fish	Crystal Darter	*Crystallaria asprella*	G3	N	occurrence not confirmed (1)
Fish	Southeastern Blue Sucker*	*Cycleptus meridionalis*	G3G4	N	
Fish	Blue Sucker	*Cycleptus elongatus*	G3G4	N	
Fish	Yazoo Darter	*Etheostoma raneyi*	G2	Y	forest plan components not needed (5)
Fish	Blackmouth Shiner	*Notropis melanostomus*	G2	Y	
Fish	Piebald Madtom	*Noturus gladiator**	G3	Y	
Fish	Freckled Darter	*Percina lenticula*	G2	Y	
Insect	Natchez Stonefly	*Alloperla natchez*	G2	Y	
Insect	Arogos skipper	*Atrytone arogos arogos*	G3G4T1T2	Y	forest plan components will be developed
Insect	Chukcho Stonefly	*Haploperla chukcho*	G2	Y	forest plan components not needed (5)
Mammal	Rafinesque’s big-eared bat	*Corynorhinus rafinesquii*	G3G4	Y	forest plan components will be developed
Mammal	Southeastern Myotis	*Myotis austroriparius*	G3G4	Y	
Mussel	Rayed Creekshell	*Anodontoides radiatus*	G3	Y	forest plan components not needed (5)
Mussel	Southern Hickorynut	*Obovaria jacksoniana*	G1G2	N	occurrence not confirmed (1)
Mussel	Alabama Hickorynut	*Obovaria unicolor*	G3	N	
Mussel	Sheepnose	*Plethobasus cyphyus*	G3	Y	forest plan components not needed (5)
Mussel	Mississippi Pigtoe	*Pleurobema beadleianum*	G2G3	Y	

Taxa	Common Name	Scientific Name	Global Rank	Confirmed Occurrence	rationale for selection / non-selection
Mussel	Pyramid Pigtoe	*Pleurobema rubrum*	G2	Y	
Reptile	Mimic Glass Lizard	*Ophisaurus mimicus*	G3	Y	forest plan components will be developed
Reptile	Black Pine Snake	*Pituophis melanoleucus lodingi*	G4T3	Y	
Nonvascular Plant	Trachyxiphium Moss	*Trachyxiphium heteroicum (Hookeriopsis heteroica)*	G2?	Y	
Vascular Plant	Shinner's False-foxglove	*Agalinis pseudaphylla*	G1G2Q	Y	
Vascular Plant	Incised Agrimony	*Agrimonia incisa*	G3	Y	forest plan components not needed (5)
Vascular Plant	Southern Three-awned Grass	*Aristida simpliciflora*	G3	Y	
Vascular Plant	Dixie grapefern	*Botrychium jenmanii*	G3G4	Y	
Vascular Plant	Baltzell's sedge	*Carex baltzelli*	G3	N	occurrence not confirmed (1)
Vascular Plant	Cypress-knee Sedge	*Carex decomposita*	G3	Y	forest plan components will be developed
Vascular Plant	Ravine Sedge	*Carex impressinervia*	G1G2	Y	
Vascular Plant	Small spreading pogonia	*Cleistes bifaria*	G3G4	Y	
Vascular Plant	Ashe Hawthorn	*Crataegus harbisonii (=C. ashei)*	G1	Y	
Vascular Plant	Three-flower Hawthorn	*Crataegus triflora*	G2	Y	
Vascular Plant	Cream Tick-trefoil	*Desmodium ochroleucum*	G2?	Y	
Vascular Plant	Small's woodfern	*Dryopteris X australis*	HYB	Y	
Vascular Plant	Butternut	*Juglans cinerea*	G3G4	Y	
Vascular Plant	Pineland Bogbutton	*Lachnocaulon digynum*	G3	Y	forest plan components not needed (5)
Vascular Plant	Bog Spicebush	*Lindera subcoriacea*	G2	Y	forest plan components will be developed
Vascular Plant	Spring Hill flax	*Linum macrocarpum*	G2?	Y	forest plan components not needed (5)
Vascular Plant	Flame Flower	*Macranthera flammea*	G3	Y	
Vascular Plant	Broadleaf Barbara's Buttons	*Marshallia graminifolia var. cynanthera*	G3	Y	forest plan components will be developed
Vascular Plant	Loose Watermilfoil	*Myriophyllum laxum*	G3	Y	
Vascular Plant	White-flowered Beardtongue	*Penstemon tenuiflorus*	G3?	N	occurrence not confirmed (1)
Vascular Plant	Carpenter's Ground-cherry	*Physalis carpenteri*	G3	Y	forest plan components not needed (5)
Vascular Plant	Chapman's Butterwort	*Pinguicula planifolia*	G3?	Y	
Vascular Plant	Southern butterwort	*Pinguicula primuliflora*	G3G4	Y	forest plan components will be developed
Vascular Plant	Yellow fringeless orchid	*Platanthera integra*	G3G4	Y	

Taxa	Common Name	Scientific Name	Global Rank	Confirmed Occurrence	rationale for selection / non-selection
Vascular Plant	Hooker's Milkwort	*Polygala hookeri*	G3	Y	forest plan components not needed (5)
Vascular Plant	Slender spike milkwort	*Polygala leptostachys*	G3G4	Y	forest plan components will be developed
Vascular Plant	Giant Orchid	*Pteroglossaspis ecristata (=Eulophia ecristata)*	G2	Y	
Vascular Plant	Oglethorpe Oak	*Quercus oglethorpensis*	G3	Y	
Vascular Plant	Orange azalea	*Rhododendron austrinum*	G3	N	occurrence not confirmed (1)
Vascular Plant	Hairy Peduncled Beakrush	*Rhynchospora crinipes*	G1	Y	forest plan components not needed (5)
Vascular Plant	Large Beakrush	*Rhynchospora macra*	G3	Y	
Vascular Plant	Night Flowering Ruellia	*Ruellia noctiflora*	G2	Y	
Vascular Plant	Bay Starvine	*Schisandra glabra*	G3	Y	
Vascular Plant	Ovate Catchfly	*Silene ovata*	G2G3	Y	forest plan components will be developed
Vascular Plant	Giant Spiral Ladies'-tresses	*Spiranthes longilabris*	G3	Y	forest plan components not needed (5)
Vascular Plant	Carolina fluffgrass	*Tridens carolinianus*	G3	Y	
Vascular Plant	Fetid trillium	*Trillium foetidissimum*	G3	Y	forest plan components will be developed
Vascular Plant	Least Trillium	*Trillium pusillum*	G3	N	occurrence not confirmed (1)
Vascular Plant	Florida Bellwort	*Uvularia floridana*	G3	Y	forest plan components will be developed
Vascular Plant	Chapman's Yellow-eyed Grass	*Xyris chapmanii*	G3	Y	poorly studied species (3)
Vascular Plant	Drummond's Yellow-eyed Grass	*Xyris drummondii*	G3	Y	forest plan components not needed (5)
Vascular Plant	Louisiana Yellow-eyed Grass	*Xyris louisianica*	G3	Y	poorly studied species (3)
Vascular Plant	Harper's Yellow-eyed Grass	*Xyris scabrifolia*	G3	Y	forest plan components will be developed

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2) Not affected by management - Species which are not affected by any current or potential form of management or lack of management in the planning area.

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G.9 Locally rare species analyzed for the National Forests in Mississippi

Taxa	Common Name	Scientific Name	Confirmed Occurrence	Rationale for selection/ non-selection
Amphibian	Four-toed Salamander	*Hemidactylium scutatum*	Y	Forest plan components not needed (5)
Amphibian	Ornate Chorus Frog	*Pseudacris ornata*	Y	Forest plan components will be developed
Amphibian	Mud Salamander	*Pseudotriton montanus*	Y	
Amphibian	Red Salamander	*Pseudotriton ruber*	Y	Secure in the forest plan area (4)
Crustacean	Lavender Burrowing Crayfish	*Fallicambarus byersi*	Y	Forest plan components not needed (5)
Crustacean	Prominence Rivulet Crayfish	*Hobbeseus prominens*	Y	
Crustacean	Choctaw Rivulet Crayfish	*Hobbeseus valleculus*	Y	
Bird	Henslow's Sparrow	*Ammodramus henslowii*	Y	
Bird	Yellow Rail	*Coturnicops noveboracensis*	Y	
Bird	Prairie Warbler	*Dendroica discolor*	Y	Not affected by management (2)
Bird	Swallow-tailed Kite	*Elanoides forficatus*	Y	Forest plan components not needed (5)
Bird	Southeastern American Kestrel	*Falco sparverius paulus*	Y	Forest plan components will be developed
Bird	Black Rail	*Laterallus jamaicensis*	Y	Forest plan components not needed (5)
Bird	Swainson's Warbler	*Limnothlypis swainsonii*	Y	Secure in the forest plan area (4)
Bird	Osprey	*Pandion haliaetus*	Y	
Fish	Southern Sand Darter	*Ammocrypta meridiana*	Y	Forest plan components not needed (5)
Fish	Steelcolor Shiner	*Cyprinella whipplei*	Y	
Fish	Tombigbee Darter	*Etheostoma lachneri*	Y	
Fish	Bluenose Shiner	*Pteronotropis welaka*	Y	
Mammal	Hoary Bat	*Lasiurus cinereus*	Y	Forest plan components will be developed
Mammal	Northern Yellow Bat	*Lasiurus intermedius*	Y	
Mammal	Oldfield Mouse	*Peromyscus polionotus*	Y	Forest plan components not needed (5)
Mammal	Black Bear	*Ursus americanus*	Y	Forest plan components will be developed
Mussel	Mucket	*Actinonaias ligamentina*	Y	Forest plan components not needed (5)
Mussel	Rock Pocketbook	*Arcidens confragosus*	Y	
Mussel	Rough Fatmucket	*Lampsilis straminea straminea*	Y	
Mussel	White Heelsplitter	*Lasmigona complanata complanata*	Y	

Taxa	Common Name	Scientific Name	Confirmed Occurrence	Rationale for selection/ non-selection
Mussel	Round Hickorynut	*Obovaria subrotunda*	N	Occurrence not confirmed (1)
Reptile	Eastern Diamondback Rattlesnake	*Crotalus adamanteus*	Y	Forest plan components will be developed
Reptile	Rainbow Snake	*Farancia erytrogramma*	Y	Forest plan components not needed (5)
Reptile	Southern Hognose Snake	*Heterodon simus*	Y	Forest plan components will be developed
Reptile	Coachwhip	*Masticophis flagellum*	Y	Secure in the forest plan area (4)
Reptile	Slender Glass Lizard	*Ophisaurus attenuatus*	U	Poorly studied species (3)
Reptile	Pine Woods Snake	*Rhadinaea flavilata*	Y	Forest plan components will be developed
Vascular Plant	Coastal Plain False-foxglove	*Agalinis aphylla*	Y	Forest plan components not needed (5)
Vascular Plant	Earleaf False-foxglove	*Agalinis auriculata*	N	Occurrence not confirmed (1)
Vascular Plant	Thin Stemmed False-foxglove	*Agalinis filicaulis*	Y	Forest plan components not needed (5)
Vascular Plant	Broad-leaved Water-platain	*Alisma subcordatum*	Y	Not affected by management (2)
Vascular Plant	Single-headed Pussytoes	*Antennaria solitaria*	Y	Secure in the forest plan area (4)
Vascular Plant	Sicklepod	*Arabis Canadensis*	Y	Forest plan components not needed (5)
Vascular Plant	American Spikenard	*Aralia racemosa*	Y	Forest plan components will be developed
Vascular Plant	Canada Wild-ginger	*Asarum canadense*	Y	
Vascular Plant	Prairie Milkweed	*Asclepias hirtella*	Y	Forest plan components not needed (5)
Vascular Plant	White Heath Aster	*Aster ericoides*	Y	
Vascular Plant	Purple-stemmed Aster	*Aster puniceus*	Y	
Vascular Plant	Bearded Grass-pink	*Calopogon barbatus*	Y	Forest plan components will be developed
Vascular Plant	Wild Hyacinth	*Camassia scilloides*	Y	Forest plan components not needed (5)
Vascular Plant	Coast Sedge	*Carex exilis*	Y	Forest plan components will be developed
Vascular Plant	Mead's Sedge	*Carex meadii*	Y	Secure in the forest plan area (4)
Vascular Plant	Small-Toothed Sedge	*Carex microdonta*	Y	Forest plan components not needed (5)
Vascular Plant	Painted Sedge	*Carex picta*	Y	
Vascular Plant	Uptight Sedge	*Carex stricta*	Y	
Vascular Plant	Big Shellbark Hickory	*Carya laciniosa*	Y	Forest plan components will be developed
Vascular Plant	Climbing Bittersweet	*Celastrus scandens*	Y	
Vascular Plant	Atlantic White Cedar	*Chamaecyparis thyoides*	Y	
Vascular Plant	Hairy Lipfern	*Cheilanthes lanosa*	N	

Taxa	Common Name	Scientific Name	Confirmed Occurrence	Rationale for selection/ non-selection
Vascular Plant	White Turtlehead	*Chelone glabra*	Y	Secure in the forest plan area (4)
Vascular Plant	Green-and-Gold	*Chrysogonum virginianum*	Y	
Vascular Plant	LeConte's Thistle	*Cirsium lecontei*	N	Forest plan components will be developed
Vascular Plant	Small Spreading Pogonia	*Cleistes bifaria (=divaricata)*	Y	Secure in the forest plan area (4)
Vascular Plant	Alternate-leaf Dogwood	*Cornus alternifolia*	Y	Forest plan components not needed (5)
Vascular Plant	Small Yellow Lady's-slipper	*Cypripedium parviflorum*	Y	Forest plan components will be developed
Vascular Plant	Yellow Lady's-slipper	*Cypripedium pubescens*	Y	
Vascular Plant	Pine Barrens Prairie Clover	*Dalea carnea var. gracilis*	Y	
Vascular Plant	Erect-leaf Witchgrass	*Dichanthelium erectifolium*	Y	Secure in the forest plan area (4)
Vascular Plant	Shootingstar	*Dodecatheon meadia*	Y	Forest plan components not needed (5)
Vascular Plant	Southern Shield Woodfern	*Dryopteris ludoviciana*	Y	Forest plan components will be developed
Vascular Plant	Eastern Purple Coneflower	*Echinacea purpurea*	Y	
Vascular Plant	Black-fruited Spikerush	*Eleocharis melanocarpa*	Y	Forest plan components not needed (5)
Vascular Plant	Robbins Spikerush	*Eleocharis robbinsii*	Y	
Vascular Plant	Three-angled Spikerush	*Eleocharis tricostata*	Y	
Vascular Plant	Green-fly Orchid	*Epidendrum magnoliae = conopseum*	Y	
Vascular Plant	Texas Pipewort	*Eriocaulon texense*	Y	
Vascular Plant	White Dog's Tooth Violet	*Erythronium albidum*	Y	
Vascular Plant	Burning Bush	*Euonymus atropurpureus*	Y	
Vascular Plant	American Columbo	*Frasera caroliniensis*	Y	
Vascular Plant	Showy Orchid	*Galearis spectabilis*	Y	Forest plan components will be developed
Vascular Plant	Dangleberry	*Gaylussacia frondosa*	Y	Forest plan components not needed (5)
Vascular Plant	Downy Rattlesnake-plantain	*Goodyera pubescens*	Y	Forest plan components will be developed
Vascular Plant	Big-leaf witch-hazel	*Hamemalis ovalis*	Y	
Vascular Plant	Crested Coralroot	*Hexalectris spicata*	Y	
Vascular Plant	Blackfoot Quillwort	*Isoetes melanopoda*	Y	Forest plan components not needed (5)
Vascular Plant	Strong Quillwort	*Isoetes valida*	Y	
Vascular Plant	Naked-fruited Rush	*Juncus gymnocarpus*	Y	Secure in the forest plan area (4)
Vascular Plant	Appendaged Lobelia	*Lobelia appendiculata*	Y	Forest plan components not needed (5)

Taxa	Common Name	Scientific Name	Confirmed Occurrence	Rationale for selection/ non-selection
Vascular Plant	Nodding Clubmoss	*Lycopodium cernuem = L. palhinhaea cernua*	Y	Not affected by management (2)
Vascular Plant	Fan Club Moss	*Lycopodium digitatum = flabelliforme*	Y	Forest plan components will be developed
Vascular Plant	Climbing Milkweed	*Matelea obliqua*	Y	Forest plan components not needed (5)
Vascular Plant	Square-stem Monkey Flower	*Mimulus ringens*	Y	Forest plan components will be developed
Vascular Plant	Big Floating Heart	*Nymphoides aquatica*	Y	
Vascular Plant	Floating Heart	*Nymphoides cordata*	Y	
Vascular Plant	Smoother Sweet-cicely	*Osmorhiza longistylis*	Y	Secure in the forest plan area (4)
Vascular Plant	Allegheny-spurge	*Pachysandra procumbens*	Y	Forest plan components will be developed
Vascular Plant	American Ginseng	*Panax quinquefolius*	Y	
Vascular Plant	Naked-stemmed Panic Grass	*Panicum nudicaule*	Y	
Vascular Plant	White Arum	*Peltandra sagittifolia*	Y	Forest plan components not needed (5)
Vascular Plant	Sharp-sepal Beardtongue	*Penstemon tenuis*	Y	
Vascular Plant	Odorless Mock-orange	*Philadelphus inodorus*	N	Occurrence not confirmed (1)
Vascular Plant	Large White Fringed Orchid	*Platanthera blephariglottis*	Y	Forest plan components not needed (5)
Vascular Plant	Crested Fringed Orchid	*Platanthera cristata*	Y	Secure in the forest plan area (4)
Vascular Plant	Purple Fringeless Orchid	*Platanthera peramoena*	Y	Forest plan components not needed (5)
Vascular Plant	Jacob's Ladder	*Polemonium reptans*	Y	
Vascular Plant	Prairie Parsley	*Polytaenia nuttallii*	Y	
Vascular Plant	Shadow-witch Orchid	*Ponthieva racemosa*	Y	
Vascular Plant	Rough Rattlesnake-root	*Prenanthes aspera*	Y	Forest plan components will be developed
Vascular Plant	Blunt Mountainmint	*Pycnanthemum muticum*	Y	Forest plan components not needed (5)
Vascular Plant	Dwarf Live Oak	*Quercus minima*	Y	
Vascular Plant	Bottomland Post Oak	*Quercus mississipiensis*	N	Occurrence not confirmed (1)
Vascular Plant	Lance-leaved Buckthorn	*Rhamnus lanceolata*	Y	Forest plan components not needed (5)
Vascular Plant	Needle Palm	*Rhapidophyllum hystrix*	Y	Forest plan components will be developed
Vascular Plant	Chapman Beakrush	*Rhynchospora stenophylla*	Y	Forest plan components not needed (5)
Vascular Plant	Slender Arrow-head	*Sagittaria isoetiformis*	Y	
Vascular Plant	Nettle-leaf Sage	*Salvia urticifolia*	Y	
Vascular Plant	Eared Goldenrod	*Solidago auriculata*	Y	

Taxa	Common Name	Scientific Name	Confirmed Occurrence	Rationale for selection/ non-selection
Vascular Plant	Appalachian Goldenrod	*Solidago flaccidifolia*	Y	
Vascular Plant	Florida Ladies-tresses	*Spiranthes brevilabris var floridana*	Y	Forest plan components will be developed
Vascular Plant	Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	Y	Forest plan components not needed (5)
Vascular Plant	American Bladdernut	*Staphylea trifolia*	Y	Secure in the forest plan area (4)
Vascular Plant	Water Southern Morning-glory	*Stylisma aquatica*	Y	Forest plan components not needed (5)
Vascular Plant	Patterson's Bindweed	*Stylisma pickeringii var pattersonii*	Y	Forest plan components will be developed
Vascular Plant	Yellow Pipewort	*Syngonanthus flavidulus*	Y	Forest plan components not needed (5)
Vascular Plant	Louisiana Trillium	*Trillium ludovicianum*	N	Occurrence not confirmed (1)
Vascular Plant	Narrow-leaf Fever Root	*Triosteum angustifolium*	Y	Secure in the forest plan area (4)
Vascular Plant	Three Birds Orchid	*Triphora trianthophora*	Y	Forest plan components will be developed
Vascular Plant	Piedmont Bladderwort	*Utricularia olivacea*	Y	Forest plan components not needed (5)
Vascular Plant	Purple Bladderwort	*Utricularia purpurea*	Y	

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Appendix H -
By-unit Analysis for various Ecological Systems and Species Associations

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Appendix H - By-unit Analysis for various Ecological Systems and Species Associations

This appendix was created to include additional by unit analysis for ecosystems and species associations where data was available and necessary to better understand the effects of each alternative within the EIS.

H.1 Ecosystems

H.1.1 Upland Longleaf Pine Forest and Woodland

As shown in Figure H 1 and Table H 1, alternatives A and B contribute little to the restoration and maintenance of upland longleaf. Alternatives C, D, and E are more successful, but will still require decades to achieve all restoration goals.

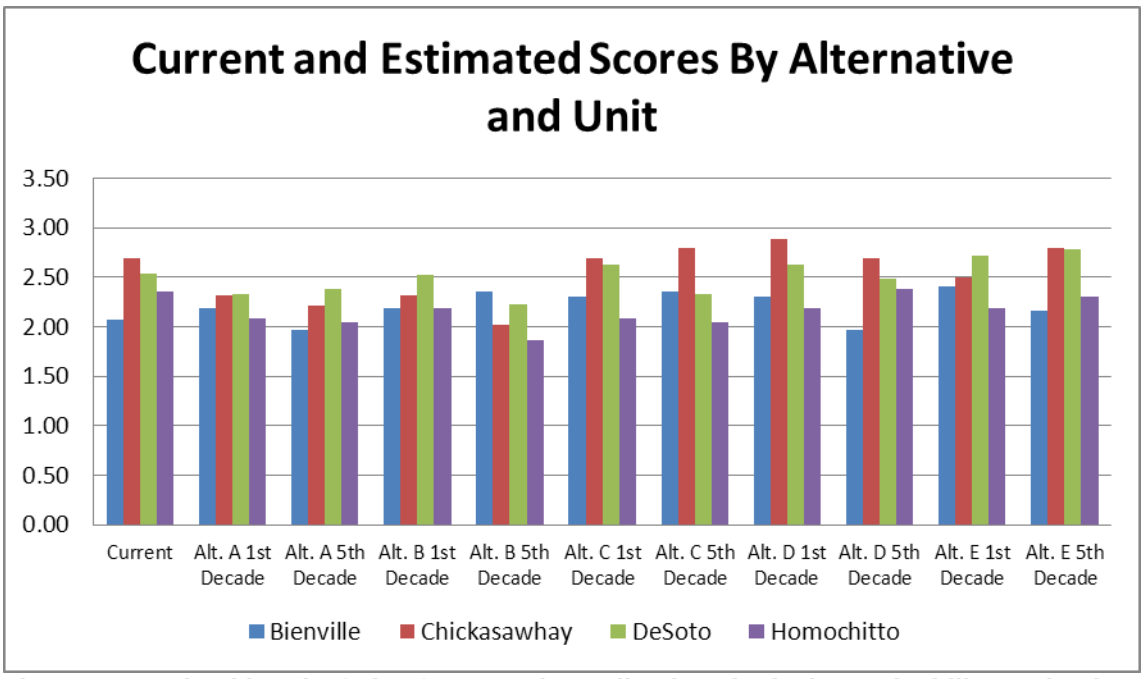


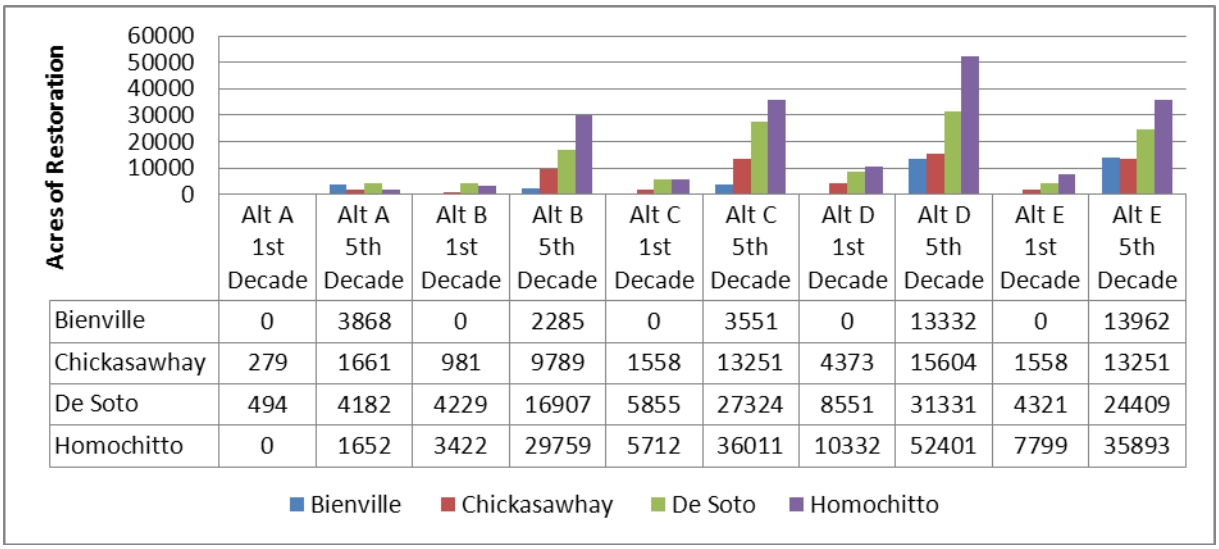
Figure H 1. Upland longleaf pine forest and woodland ecological sustainability evaluation scores by alternative and unit

Table H 1. Upland longleaf pine forest and woodland ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Bienville	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
	2.07	2.19	1.97	2.19	2.35	2.30	2.35	2.30	1.97	2.41	2.16
Chickasawhay	Good	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good
	2.69	2.31	2.21	2.31	2.02	2.69	2.79	2.88	2.69	2.50	2.79
De Soto	Good	Fair	Fair	Good	Fair	Good	Fair	Good	Fair	Good	Good
	2.53	2.33	2.38	2.52	2.22	2.62	2.33	2.62	2.48	2.72	2.78
Homochitto	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
	2.35	2.08	2.05	2.19	1.86	2.08	2.05	2.19	2.38	2.19	2.30

The key attributes and corresponding actions to assure the ecological sustainability are as follows:

- Percent acres in appropriate system type (including acres restored from previously converted system types) (Figure H 2)
- Percent of occurrences in mature open canopy conditions (Figure H 3)
- Percent acres burned at the desired interval and seasonality/intensity (Figure H 4 and Figure H 5)



	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Bienville	0	3868	0	2285	0	3551	0	13332	0	13962
Chickasawhay	279	1661	981	9789	1558	13251	4373	15604	1558	13251
De Soto	494	4182	4229	16907	5855	27324	8551	31331	4321	24409
Homochitto	0	1652	3422	29759	5712	36011	10332	52401	7799	35893

Figure H 2. Upland longleaf pine forest and woodland restoration acres by alternative and unit

Despite the impressive change over time depicted in Figure H 2, and the acreage being restored, upland longleaf pine ecosystem still only scores as “good” in even the most ambitious alternatives. These scores are due in part to the fact that less than 3 percent of the original longleaf coverage remains rangewide due to forest management practices of the 20th century. While National Forest System lands, in general, harbor more longleaf than the surrounding landscape, National Forests in Mississippi has not been immune to longleaf decline. The amount of restoration needed to achieve a “good” rating is likely to require intensive efforts well into the 22nd century.

Alternative A contributes little to the restoration of upland longleaf while alternative B, based on our current trajectory, shows some improvement by the 5th decade. Alternatives C, D, and E are considerably more successful, but will still require decades to achieve all restoration goals.

It is worth noting that lower restoration rates, particularly on the Bienville, are due, in part, to management of red-cockaded woodpeckers in mature loblolly pine forests. This management limits the number of acres that can be restored to upland longleaf in the near term. As adjacent restored longleaf stands mature to the point of accommodating red-cockaded woodpecker needs, the need to retain mature loblolly will decrease accordingly.

Where upland longleaf currently exists or restoration is planned, the desired condition of occurrences is canopy closure of less than 80 percent and trees 60 years old and older. Under all but alternative A, occurrences extant at any given time are in most cases meeting the criteria for mature open conditions (Figure H 3) based on thinning and burning activities. The percentages shown for alternative B, while impressive, are based on fewer restored acres than alternatives C, D, and E.

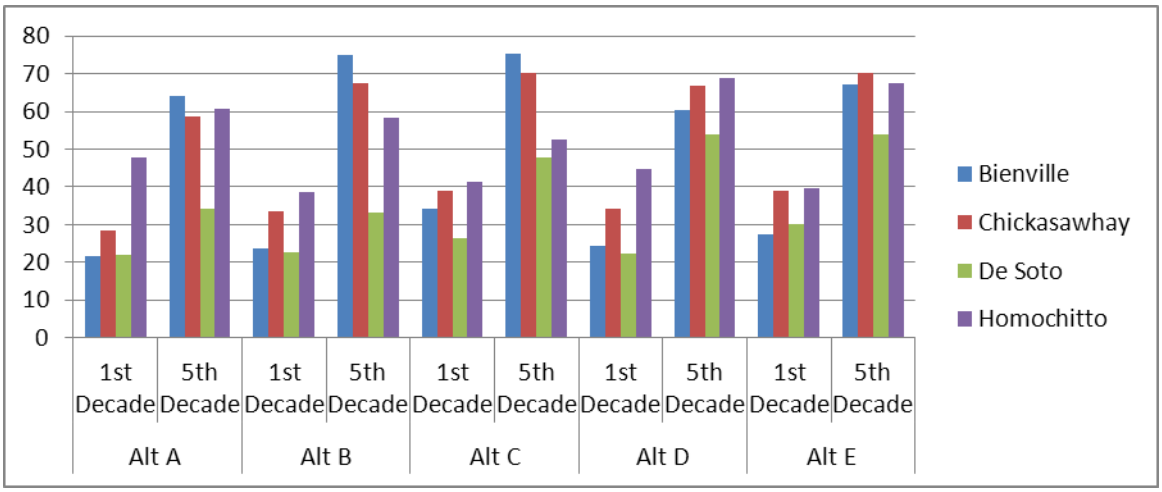
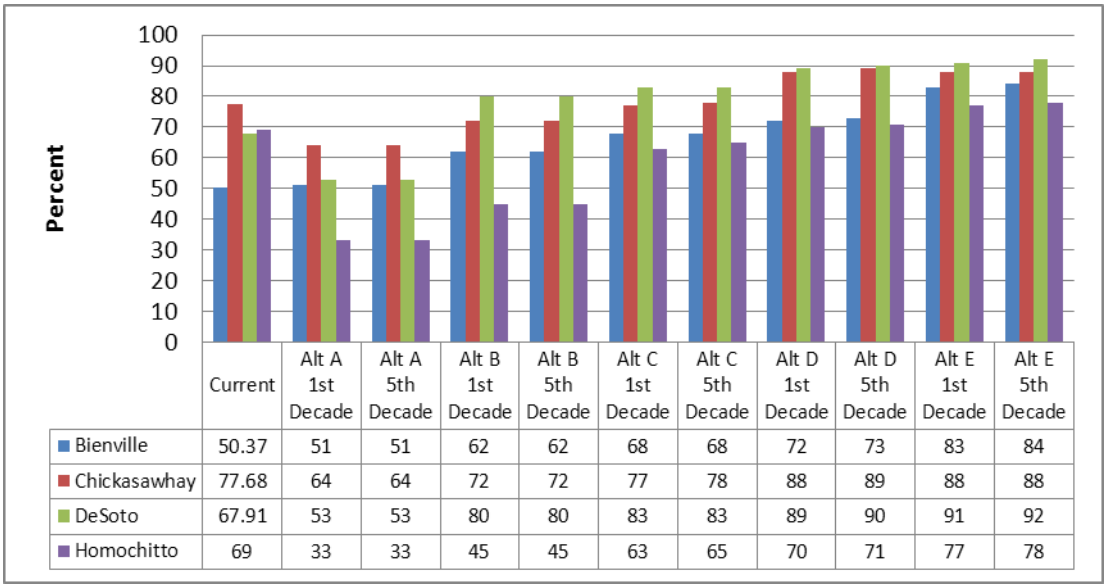


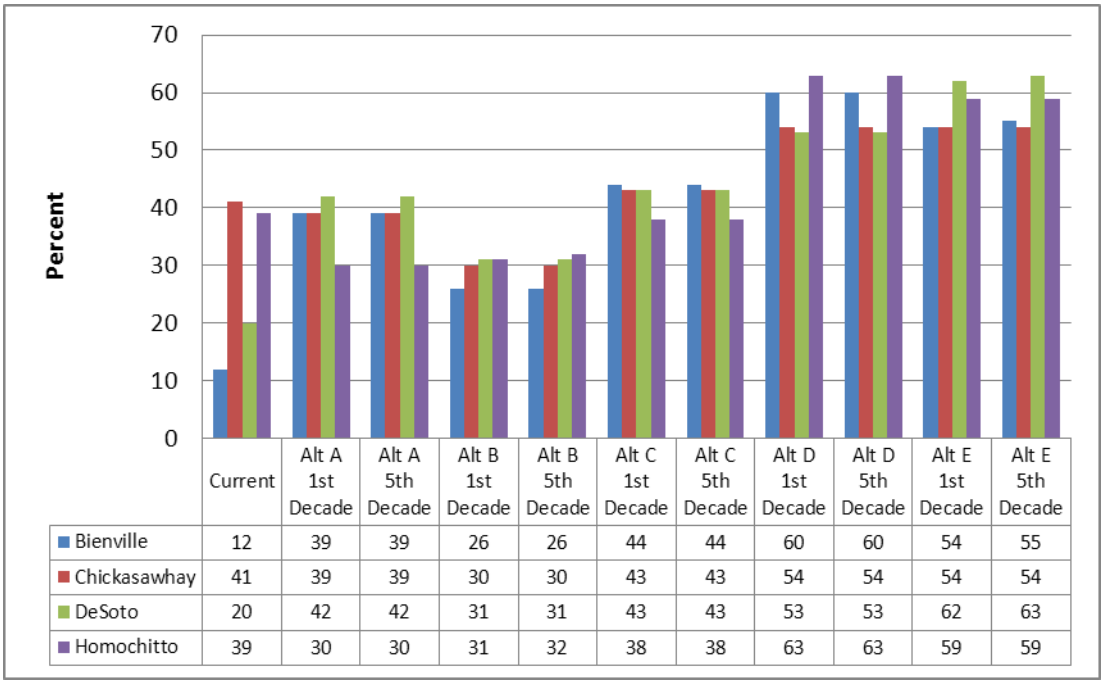
Figure H 3. Percent of upland longleaf pine forest and woodland in mature open canopy condition

Figure H 4 and Figure H 5 show fire regime variables by alternative. Herbaceous dominated understories, including grasses and forbs, are important attributes of healthy longleaf ecosystems best achieved by the application of frequent growing season fire, ideally once every 1 to 3 years (desired interval). These data show that both fire frequency and seasonality/intensity, in most cases, are well within the “good” to “very good” range and increase respectively from alternatives C thru E. It is worth noting, that alternatives C, D, and E, due to increasing restored acres by alternative, are achieving high scores while burning significantly more acres.



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Bienville	50.37	51	51	62	62	68	68	72	73	83	84
Chickasawhay	77.68	64	64	72	72	77	78	88	89	88	88
DeSoto	67.91	53	53	80	80	83	83	89	90	91	92
Homochitto	69	33	33	45	45	63	65	70	71	77	78

Figure H 4. Percent of upland longleaf pine forest and woodland burned at desired interval by alternative and unit



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Bienville	12	39	39	26	26	44	44	60	60	54	55
Chickasawhay	41	39	39	30	30	43	43	54	54	54	54
DeSoto	20	42	42	31	31	43	43	53	53	62	63
Homochitto	39	30	30	31	32	38	38	63	63	59	59

Figure H 5. Percent of upland longleaf pine forest and woodland burned in the growing season by alternative and unit

H.1.2 Shortleaf Pine-Oak Forest and Woodland

As shown in Figure H 6 and Table H 2, alternative A contributes little to the restoration and maintenance of shortleaf-oak while alternatives B and E, shows some improvement over time but still all show a fair overall ecological sustainability evaluation score. Alternatives C and D are more successful, but will still require decades to achieve all restoration goals. Only alternatives C and D show acceptable rates of ecological sustainability by the 5th decade.

Table H 2. Shortleaf pine-oak forest and woodland ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Fair	Poor	Poor	Fair	Fair	Fair	Good	Fair	Good	Fair	Fair
	1.83	1.49	1.49	2.03	2.46	1.97	2.62	1.86	2.81	1.86	2.38
Bienville	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
	2.08	2.06	2.06	2.06	2.06	2.14	2.22	2.14	2.14	2.25	2.33
Holly Springs	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Good	Fair	Fair
	2.16	1.72	1.61	2.06	2.39	2.56	2.67	2.33	2.78	2.42	2.42
Trace	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fair	Good	Fair	Fair
	1.74	1.53	1.53	2.03	2.41	2.03	2.59	1.94	2.79	1.94	2.44
Yalobusha	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Fair
	2.28	1.74	1.63	2.03	2.34	2.51	2.63	2.51	2.86	2.46	2.43

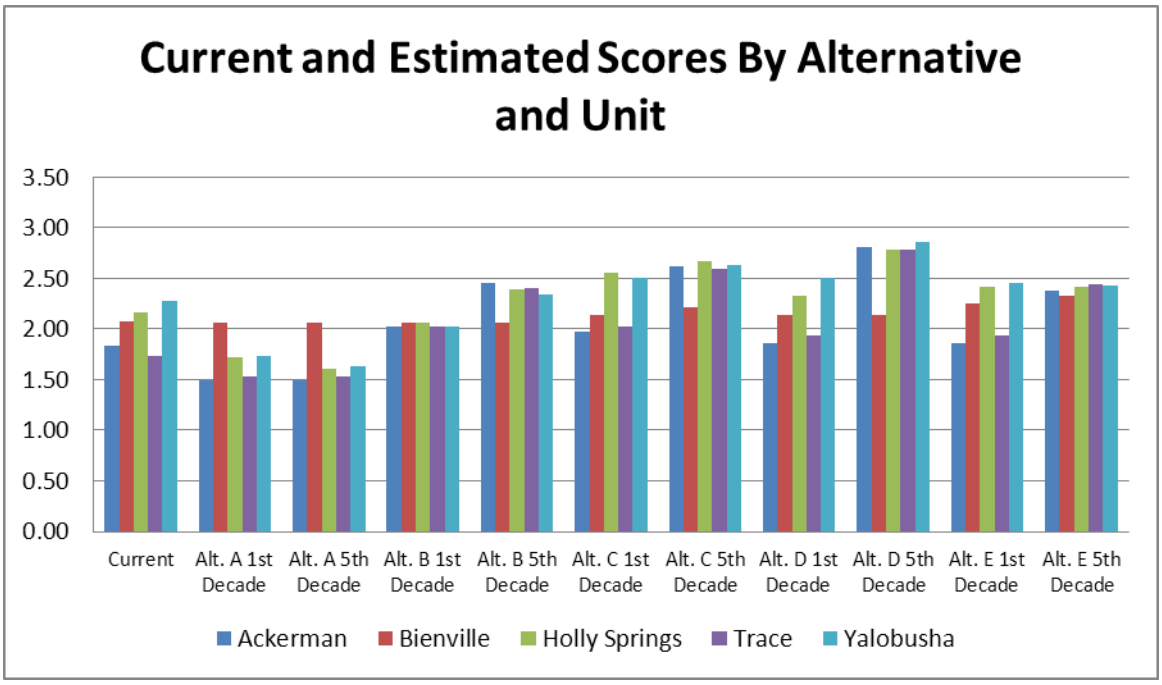


Figure H 6. Shortleaf pine-oak forest and woodland ecological sustainability evaluation scores by alternative and unit

The primary key attributes and corresponding actions to assure the ecological sustainability are as follows:

- Percent acres in appropriate system type (including acres restored from previously converted system types) (Figure H 7)
- Percent of occurrences in mature open canopy conditions (Figure H 8)
- Percent acres burned at the desired interval and seasonality/intensity (Figure H 9 and Figure H 10).

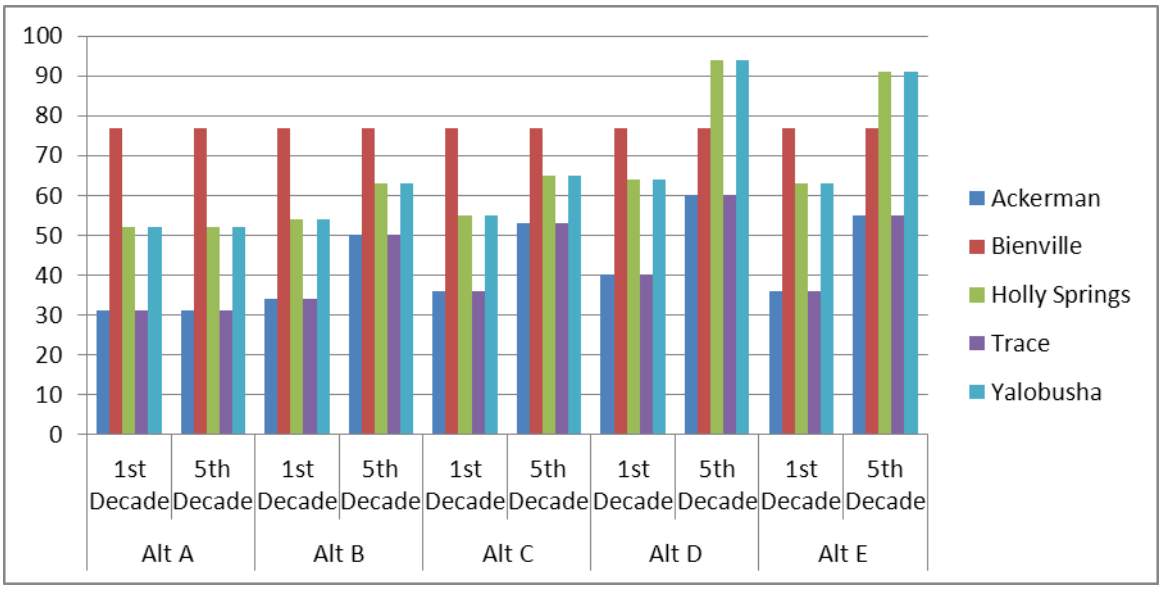


Figure H 7. Shortleaf pine-oak forest and woodland percentage in appropriate system by alternative and unit

Alternative A does not increase the coverage of this ecosystem over time. In alternatives B and C, however, coverage does increase somewhat by the 5th decade. Alternatives D and E, on the other hand, contribute significantly to the increased abundance of this system type especially on the Holly Springs and Yalobusha units. The Bienville unit contains relatively little potential acreage for this system type and therefore changes little over time by alternative.

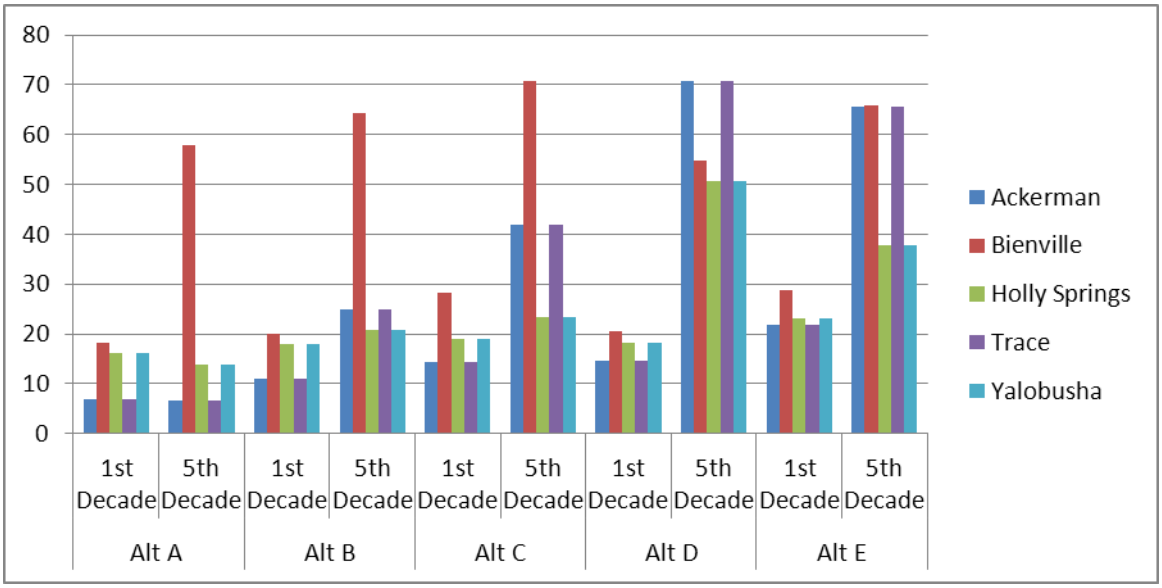
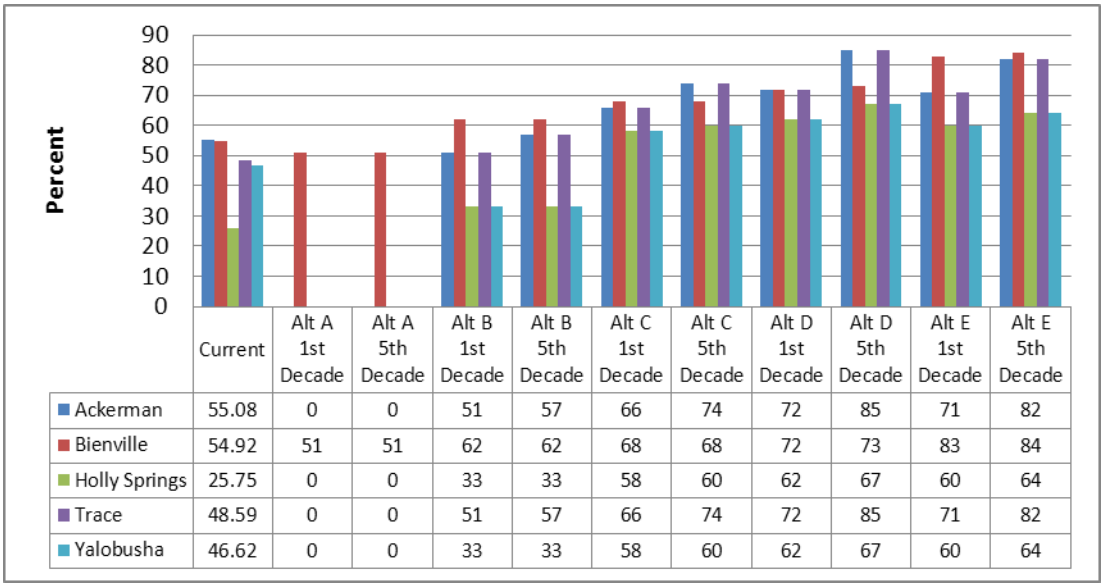


Figure H 8. Shortleaf pine-oak forest and woodland percentage mature open by alternative and unit

With the exception of the Bienville unit which contains little shortleaf-oak, estimated outcomes regarding mature open conditions vary widely by alternative and unit. Overall, alternative D and to a lesser extent alternative E, provide the best canopy and age class conditions by the 5th decade due to more extensive

thinning activities. Alternative C also provides some improvements in both decades while alternative B provides only modest improvements. Alternative A shows degradation to the system by the 5th decade, again with the exception of the Bienville unit which is related to red-cockaded woodpecker habitat management mandates.

Figure H 9 and Figure H 10 below show fire regime variables by alternative. Herbaceous dominated understories, including grasses and forbs, are important attributes of healthy shortleaf-oak ecosystems best achieved by the application of frequent growing season fire, ideally once every 1 to 3 years (desired interval).

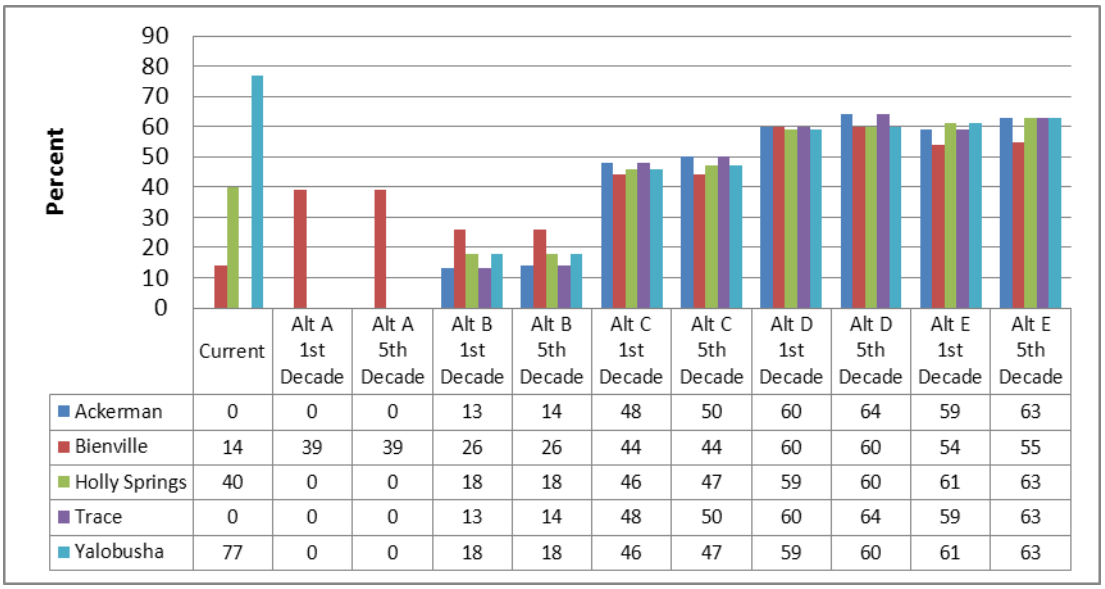


	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Ackerman	55.08	0	0	51	57	66	74	72	85	71	82
Bienville	54.92	51	51	62	62	68	68	72	73	83	84
Holly Springs	25.75	0	0	33	33	58	60	62	67	60	64
Trace	48.59	0	0	51	57	66	74	72	85	71	82
Yalobusha	46.62	0	0	33	33	58	60	62	67	60	64

Figure H 9. Percent of shortleaf pine-oak forest and woodland burned at desired interval by alternative and unit

Alternative A does not allow for any prescribed fire on the following units: Ackerman, Holly Springs, Trace, and Yalobusha. As a result, only Bienville occurrences of shortleaf-oak will receive prescribed fire under this alternative due to threatened and endangered mandates.

All other alternatives show general improvement in fire regimes by the 5th decade although alternative B show somewhat mixed results when examined by unit. Alternatives C, D, and E are estimated to best provide for the long-term fire needs of this ecosystem, scoring “good” or “very good” for each decade by each alternative for each unit.



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Ackerman	0	0	0	13	14	48	50	60	64	59	63
Bienville	14	39	39	26	26	44	44	60	60	54	55
Holly Springs	40	0	0	18	18	46	47	59	60	61	63
Trace	0	0	0	13	14	48	50	60	64	59	63
Yalobusha	77	0	0	18	18	46	47	59	60	61	63

Figure H 10. Percent of shortleaf pine-oak forest and woodland burned in the growing season by alternative and unit

H.1.3 Loblolly Forest

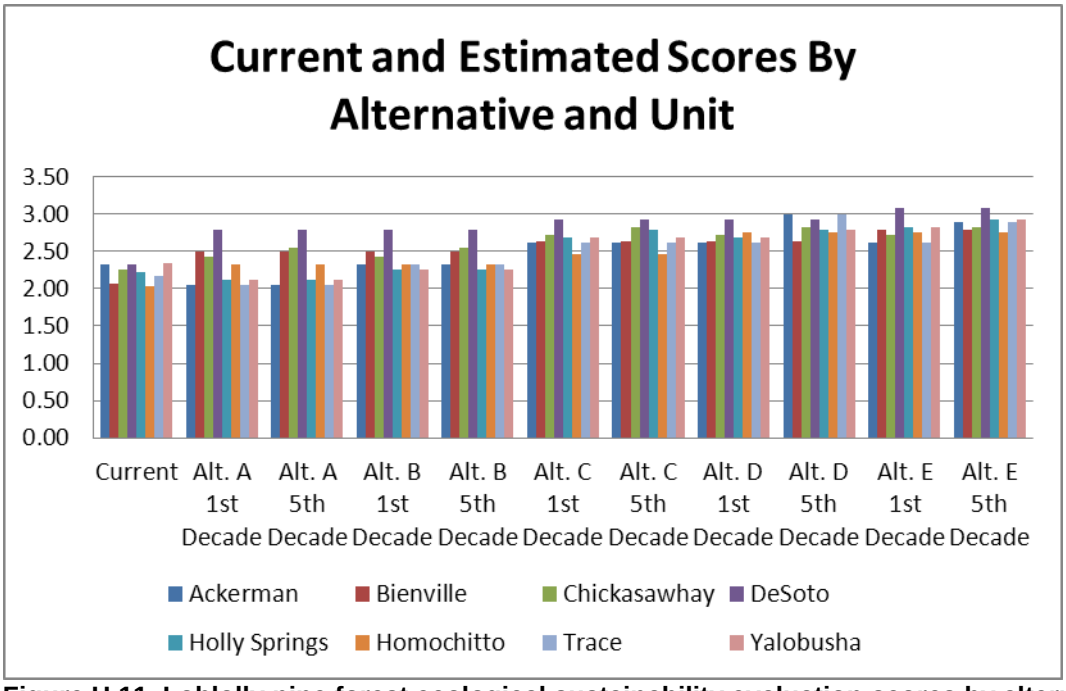


Figure H 11. Loblolly pine forest ecological sustainability evaluation scores by alternative and unit

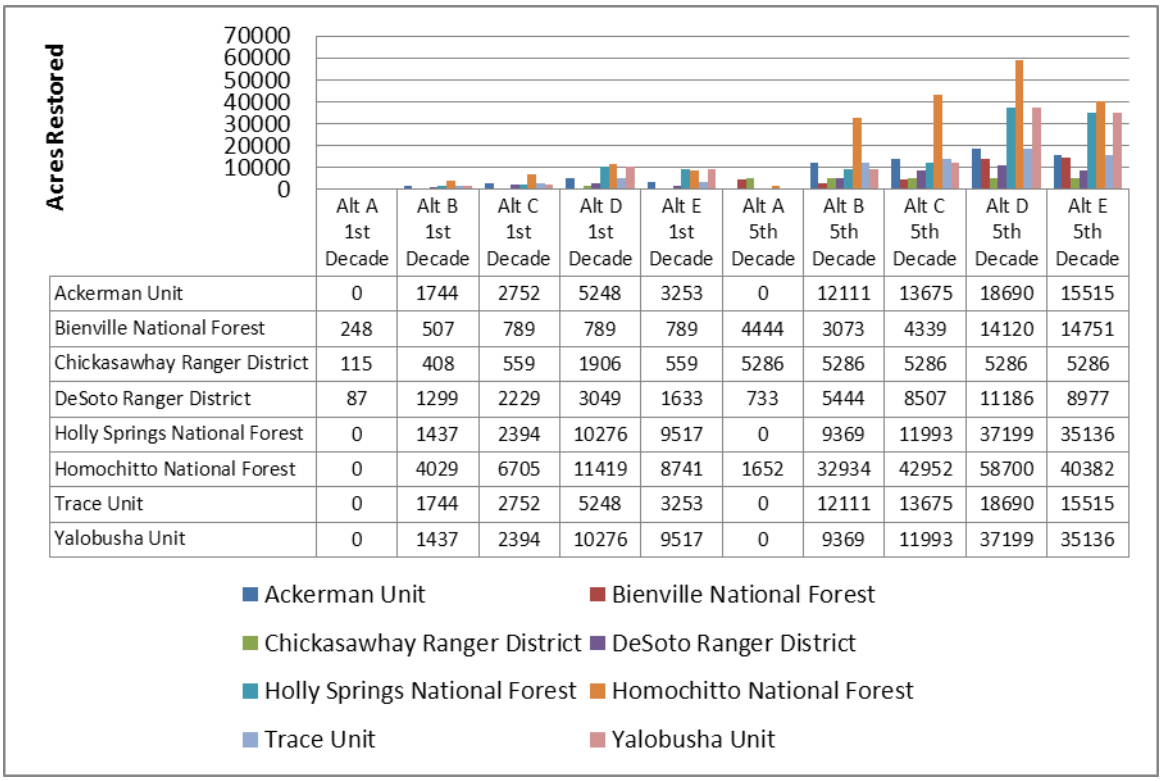
Table H 3. Loblolly forest ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fair	Good
	2.32	1.80	1.80	2.12	2.12	2.44	2.44	2.44	2.88	2.44	2.76
Bienville	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good
	2.06	2.32	2.32	2.32	2.32	2.48	2.48	2.48	2.48	2.64	2.64
Chickasawhay	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Good	Good
	2.25	2.24	2.36	2.24	2.36	2.56	2.68	2.56	2.68	2.56	2.68
De Soto	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.33	2.65	2.65	2.65	2.65	2.81	2.81	2.81	2.81	2.96	2.96
Holly Springs	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Good	Good
	2.22	1.88	1.88	2.04	2.04	2.52	2.64	2.52	2.64	2.68	2.80
Homochitto	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good
	2.03	2.12	2.12	2.12	2.12	2.28	2.28	2.60	2.60	2.60	2.60
Trace	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fair	Good
	2.16	1.80	1.80	2.12	2.12	2.44	2.44	2.44	2.88	2.44	2.76
Yalobusha	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Good	Good
	2.34	1.88	1.88	2.04	2.04	2.52	2.52	2.52	2.64	2.68	2.80

As shown in Figure H 11 and Table H 3, alternatives A and B contribute little to the restoration loblolly pine forest to native ecosystems while alternatives C, D, and E, are more successful achieving acceptable ratings forest-wide by the 1st decade, but will still require decades to achieve all restoration goals. Alternative A does not allow for any forest management on the following units: Ackerman, Holly Springs, Trace, and Yalobusha. In other alternatives, restoration efforts will take longer on some units than on others depending on amount, age, and condition of loblolly pine forest to restore to desirable ecosystems. For example, on the Ackerman and Trace units, restoration of loblolly to native ecosystems is not as urgently needed as on other units where upland longleaf restoration is a high priority. The Bienville unit, on the other hand, contains red-cockaded woodpecker populations in loblolly forest which takes precedence over longleaf restoration. In this case, loblolly forest should not be removed until suitable mature longleaf stands are available nearby for red-cockaded woodpecker.

The primary key attributes and corresponding actions to assure the ecological sustainability are as follows:

- Percent acres in appropriate system type (including acres restored from previously converted system types) (Figure H 12)
- Percent of occurrences in mature open canopy conditions (Figure H 13)
- Percent acres burned at the desired interval and seasonality/intensity (Figure H 14 and Figure H 15).



	Alt A 1st Decade	Alt B 1st Decade	Alt C 1st Decade	Alt D 1st Decade	Alt E 1st Decade	Alt A 5th Decade	Alt B 5th Decade	Alt C 5th Decade	Alt D 5th Decade	Alt E 5th Decade
Ackerman Unit	0	1744	2752	5248	3253	0	12111	13675	18690	15515
Bienville National Forest	248	507	789	789	789	4444	3073	4339	14120	14751
Chickasawhay Ranger District	115	408	559	1906	559	5286	5286	5286	5286	5286
DeSoto Ranger District	87	1299	2229	3049	1633	733	5444	8507	11186	8977
Holly Springs National Forest	0	1437	2394	10276	9517	0	9369	11993	37199	35136
Homochitto National Forest	0	4029	6705	11419	8741	1652	32934	42952	58700	40382
Trace Unit	0	1744	2752	5248	3253	0	12111	13675	18690	15515
Yalobusha Unit	0	1437	2394	10276	9517	0	9369	11993	37199	35136

Figure H 12. Acres of loblolly restored to appropriate system

As loblolly forests are restored to native ecosystems, the remaining loblolly forest acreage decreases becoming easier to manage for desired structural conditions. Where loblolly forest currently exists or is not yet restored at any given time, the desired condition of occurrences is canopy closure of less than 80 percent and trees 60 years old and older in order to achieve high function conditions that emulate mature native ecosystem types such as longleaf. Under all alternatives, occurrences extant at any given time are in most cases not meeting the criteria for mature open conditions based on thinning, with the exception of the Chickasawhay unit. Due to the massive spatial extent of loblolly pine forest on most units, thinning operations are unlikely to be completed prior to restoration to longleaf. Thinned loblolly pine forest tends to revert to closed canopy conditions over time if not periodically re-thinned thus creating a cycle of thinning needs that is extremely difficult to successfully meet at the scale required.

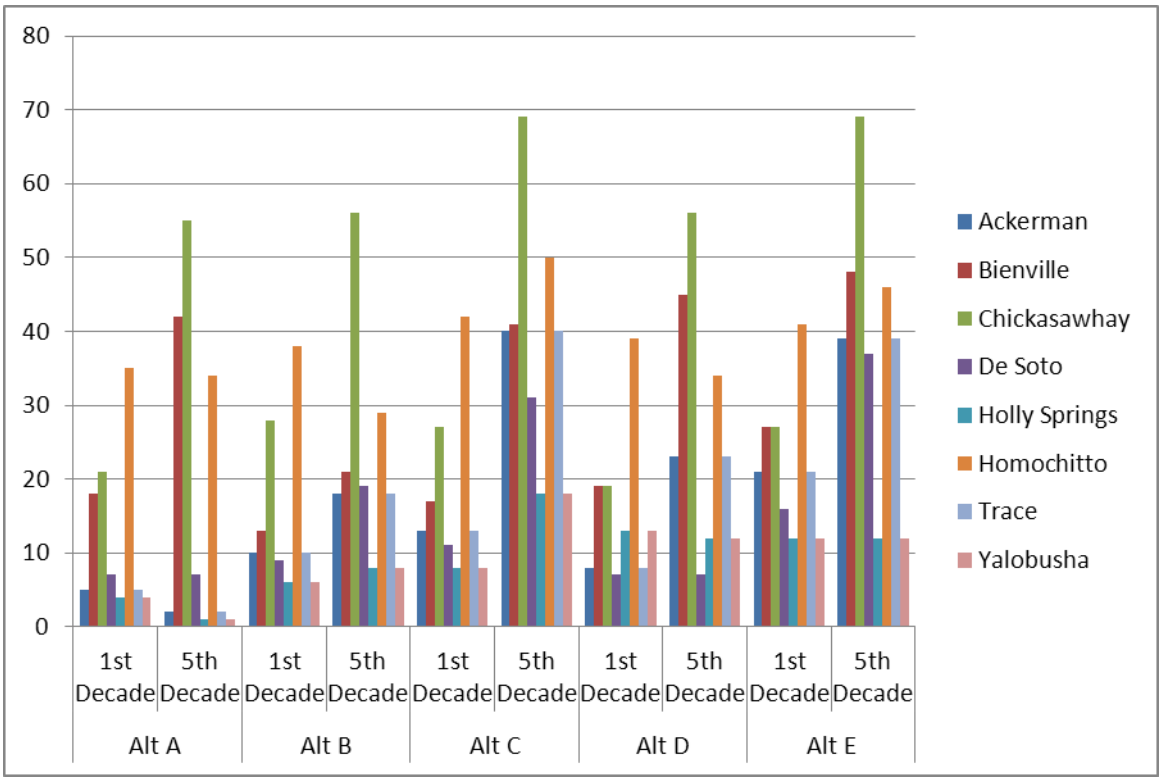
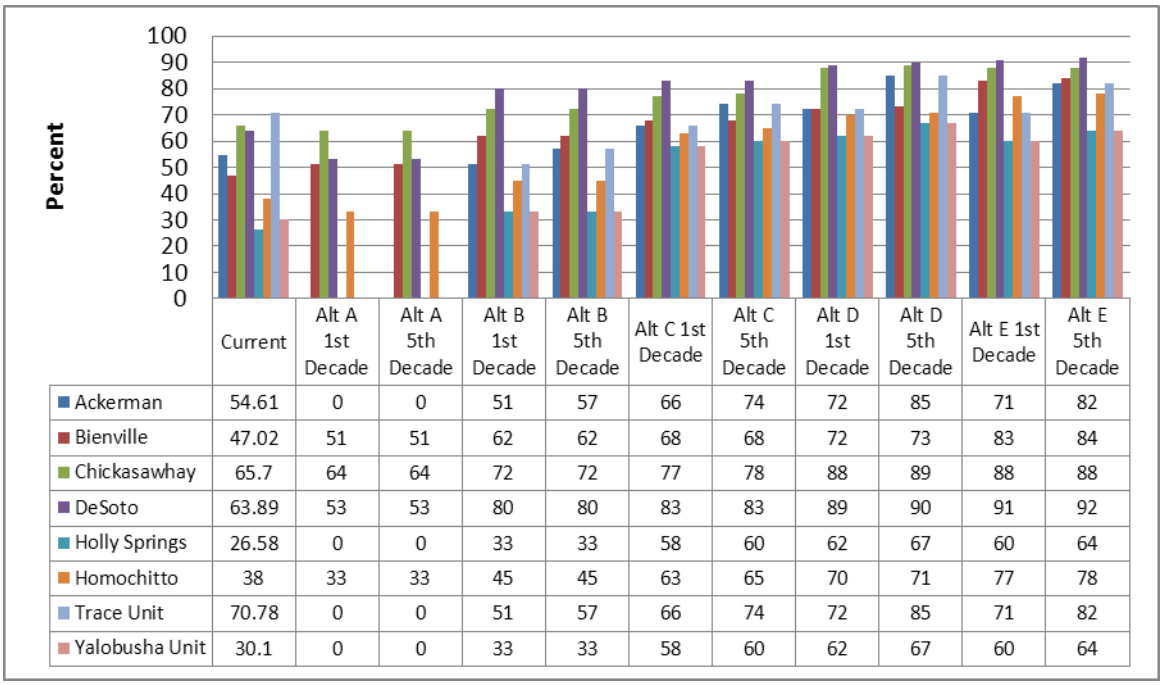


Figure H 13. Percent of loblolly forest in mature open (high function) condition

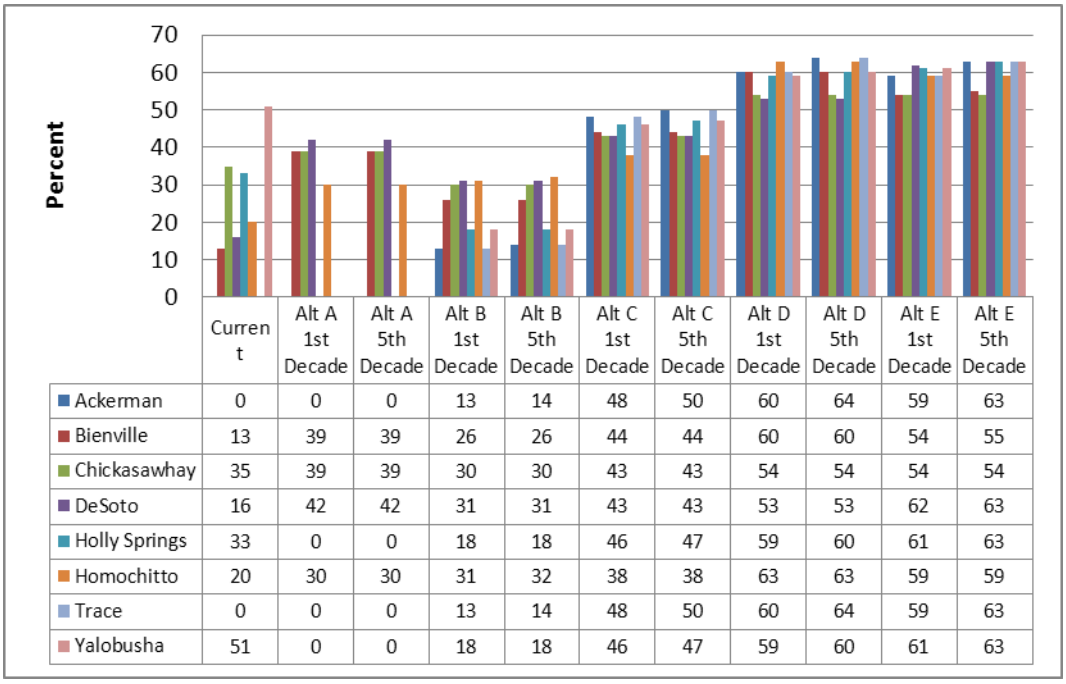
Fire frequency and seasonality/intensity goals also become easier as loblolly forest coverage decreases (Figure H 14 and Figure H 15).

Alternative A does not allow for any prescribed fire on the following units: Ackerman, Holly Springs, Trace, and Yalobusha. All other alternatives show general improvement in fire regimes by the 5th decade although alternative B shows somewhat mixed results when examined by unit. Alternatives C, D, and E are expected to provide for the long-term fire needs of this ecosystem, scoring "good" or "very good" for each decade by each alternative for each unit.



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Ackerman	54.61	0	0	51	57	66	74	72	85	71	82
Bienville	47.02	51	51	62	62	68	68	72	73	83	84
Chickasawhay	65.7	64	64	72	72	77	78	88	89	88	88
DeSoto	63.89	53	53	80	80	83	83	89	90	91	92
Holly Springs	26.58	0	0	33	33	58	60	62	67	60	64
Homochitto	38	33	33	45	45	63	65	70	71	77	78
Trace Unit	70.78	0	0	51	57	66	74	72	85	71	82
Yalobusha Unit	30.1	0	0	33	33	58	60	62	67	60	64

Figure H 14. Percent of loblolly burned at the desired interval by alternative and unit



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Ackerman	0	0	0	13	14	48	50	60	64	59	63
Bienville	13	39	39	26	26	44	44	60	60	54	55
Chickasawhay	35	39	39	30	30	43	43	54	54	54	54
DeSoto	16	42	42	31	31	43	43	53	53	62	63
Holly Springs	33	0	0	18	18	46	47	59	60	61	63
Homochitto	20	30	30	31	32	38	38	63	63	59	59
Trace	0	0	0	13	14	48	50	60	64	59	63
Yalobusha	51	0	0	18	18	46	47	59	60	61	63

Figure H 15. Percent of loblolly pine forest burned in the growing season by alternative and unit

H.1.4 Slash Pine

As shown in Figure H 16 and Table H 4, alternative A does not allow for any forest management on the following units: Ackerman, Trace, and Yalobusha. In other alternatives, restoration efforts will take longer on some units than on others depending on amount, age, and condition of slash pine forest to restore to desirable ecosystems. For example, on the Ackerman, Trace, and Yalobusha units, restoration of slash

pine to native ecosystems is not as urgently needed as on other units where upland longleaf restoration is a high priority. These units also contain very little slash pine forest and therefore are not represented in many scoring datasets.

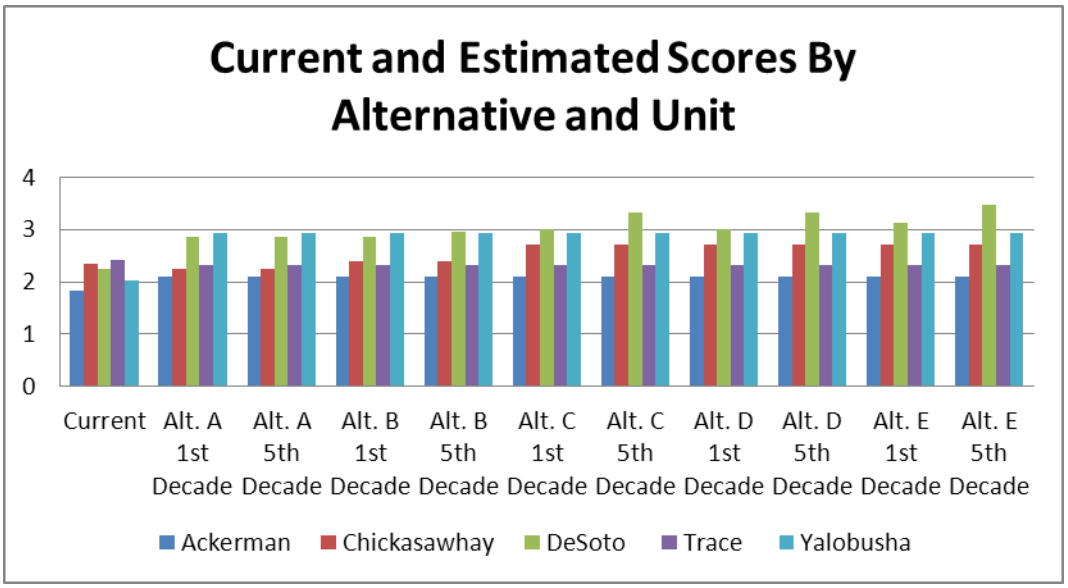


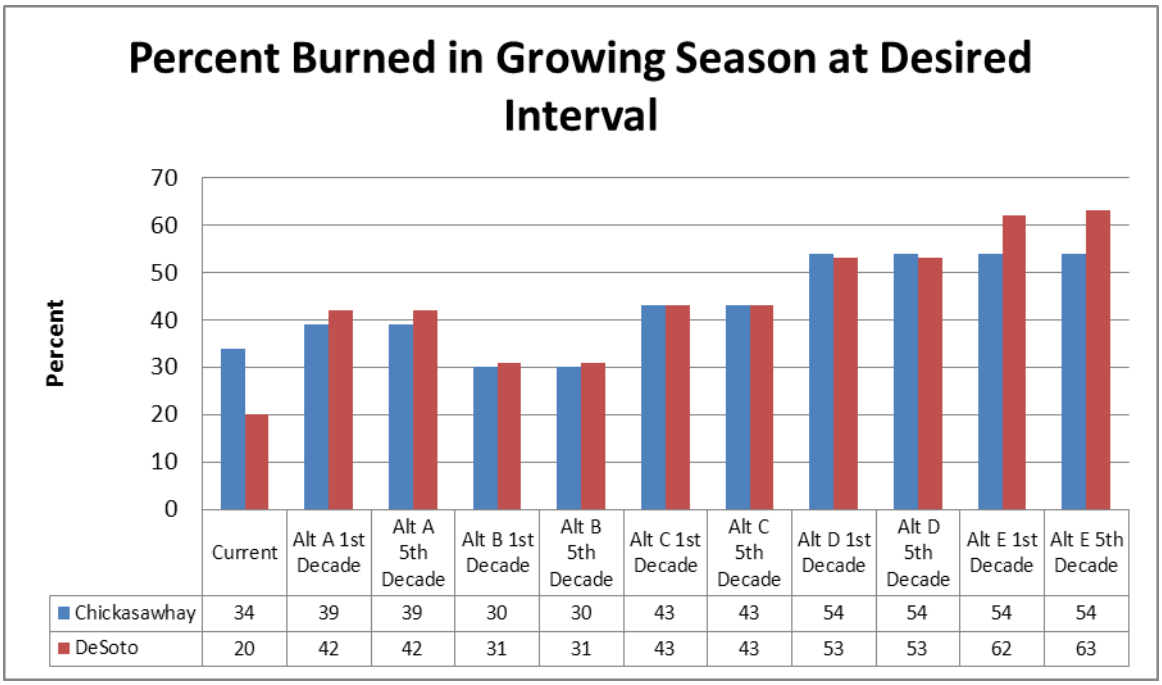
Figure H 16. Slash pine forest ecological sustainability evaluation scores by alternative and unit

Table H 4. Slash pine forest ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
	1.83	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09
Chickasawhay	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Good	Good
	2.34	2.24	2.24	2.40	2.40	2.72	2.72	2.72	2.72	2.72	2.72
De Soto	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.25	2.72	2.72	2.72	2.84	2.88	3.24	2.88	3.24	3.04	3.40
Trace	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
	2.41	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09
Yalobusha	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.03	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71

The primary key attributes and corresponding actions to assure the ecological sustainability are as follows:

- Percent acres in appropriate system type (including acres restored to native system types) (Figure H 17)
- Percent of occurrences in mature open canopy conditions (Figure H 18)
- Percent acres burned at the desired interval and seasonality/intensity (Figure H 19 and Figure H 20).



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Chickasawhay	34	39	39	30	30	43	43	54	54	54	54
DeSoto	20	42	42	31	31	43	43	53	53	62	63

Figure H 17. Slash pine forest percent burned in growing season at desired interval

As slash pine forests are restored to native ecosystems (Figure H 18), the remaining slash pine forest acreage decreases becoming easier to manage for desired structural conditions (Figure H 19). Where slash pine forest currently exists or is not yet restored at any given time, the desired condition of occurrences is canopy closure of less than 80 percent and trees 60 years old and older in order to achieve high function conditions that emulate mature native ecosystem types such as longleaf. Under all alternatives, occurrences extant at any given time do not, in most cases, meet the criteria for mature open conditions based on thinning, with the exception of the Chickasawhay Unit in the 5th decade of alternative E. Due to the massive spatial extent of slash pine forest on some southern units, thinning operations are unlikely to be completed prior to restoration of longleaf. Thinned slash pine forest tends to revert to closed canopy conditions over time if not periodically re-thinned thus creating a cycle of thinning needs that is extremely difficult to successfully meet at the scale required.

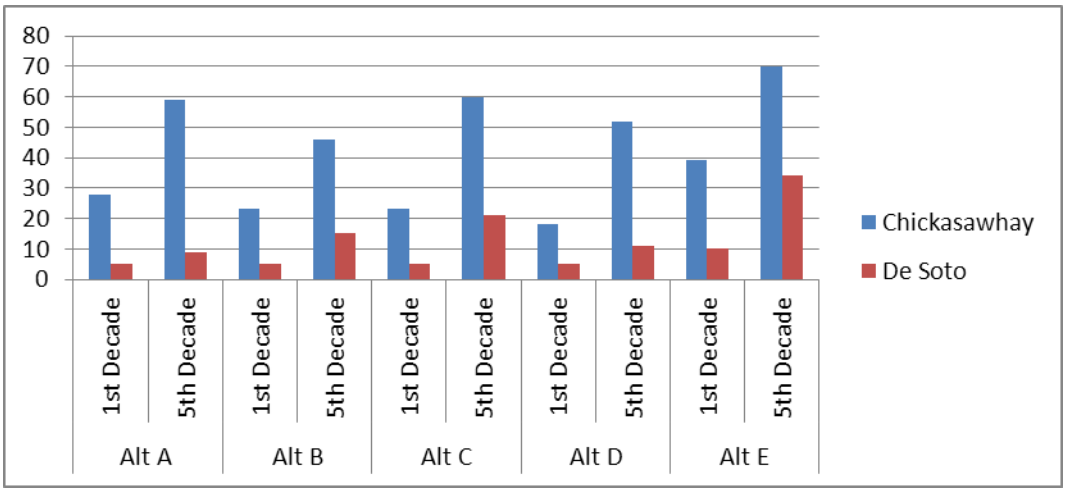
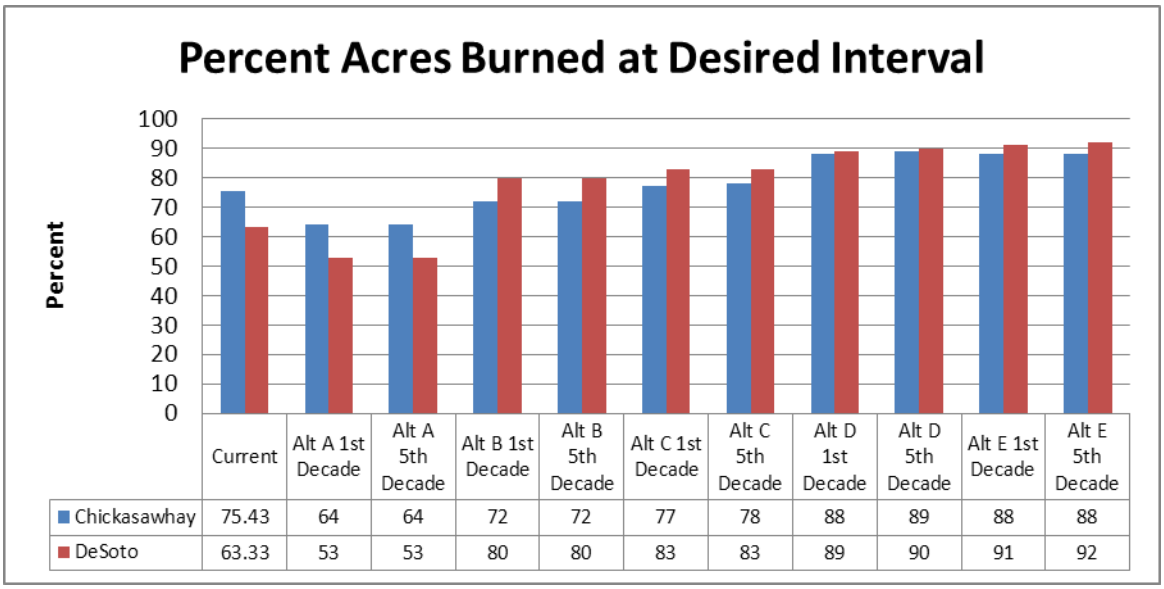
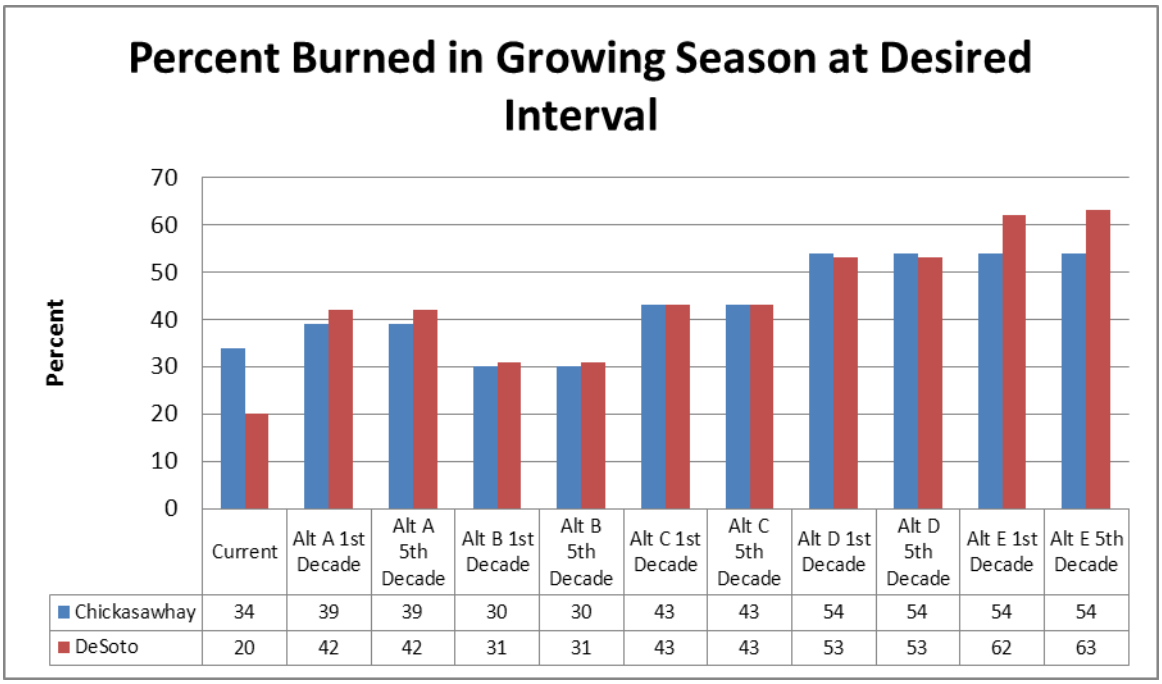


Figure H 18. Percent of slash pine forest in mature open (high function) condition



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Chickasawhay	75.43	64	64	72	72	77	78	88	89	88	88
DeSoto	63.33	53	53	80	80	83	83	89	90	91	92

Figure H 19. Percent of slash pine forest burned at desired interval by alternative and unit



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Chickasawhay	34	39	39	30	30	43	43	54	54	54	54
DeSoto	20	42	42	31	31	43	43	53	53	62	63

Figure H 20. Percent of slash pine forest burned in the growing season by alternative and unit

The following units contained very small amounts of slash pine and were not used to calculate scores for fire regime: Ackerman, Trace, and Yalobusha. Only the Chickasawhay and the De Soto were evaluated for fire regime scores.

Fire frequency and seasonality/intensity goals also become easier as slash pine forest coverage decreases. Frequency goals are met with all alternatives on both units scoring “good” or “very good” with the highest scores concentrated in alternatives C, D, and E.

Alternative A meets good status by the 5th decade for seasonality/intensity. Alternative B achieves only fair status for fire seasonality/intensity. All other alternatives show general improvement in fire seasonality/intensity by the 1st decade achieving "good" scores and in some cases "very good" by the 5th decade.

H.1.5 Northern Dry Upland Hardwood Forest

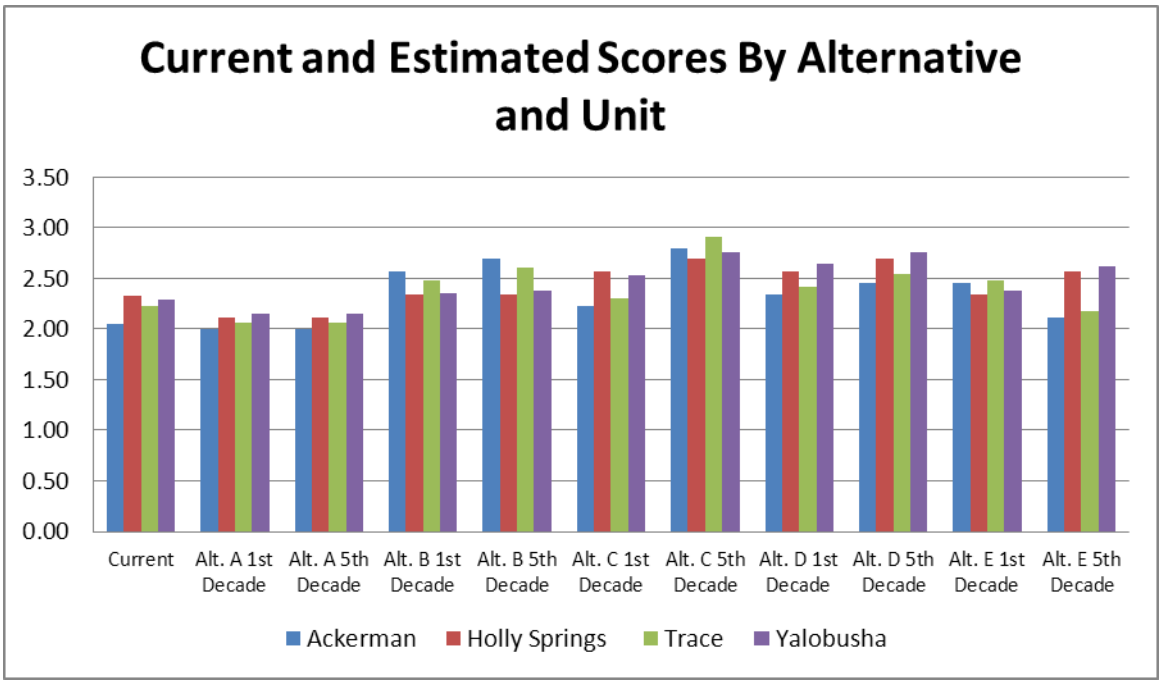


Figure H 21. Northern dry upland hardwood forest ecological sustainability evaluation scores by alternative and unit

Table H 5. Northern dry upland hardwood forest ecological sustainability evaluation scores and rankings by unit and alternative

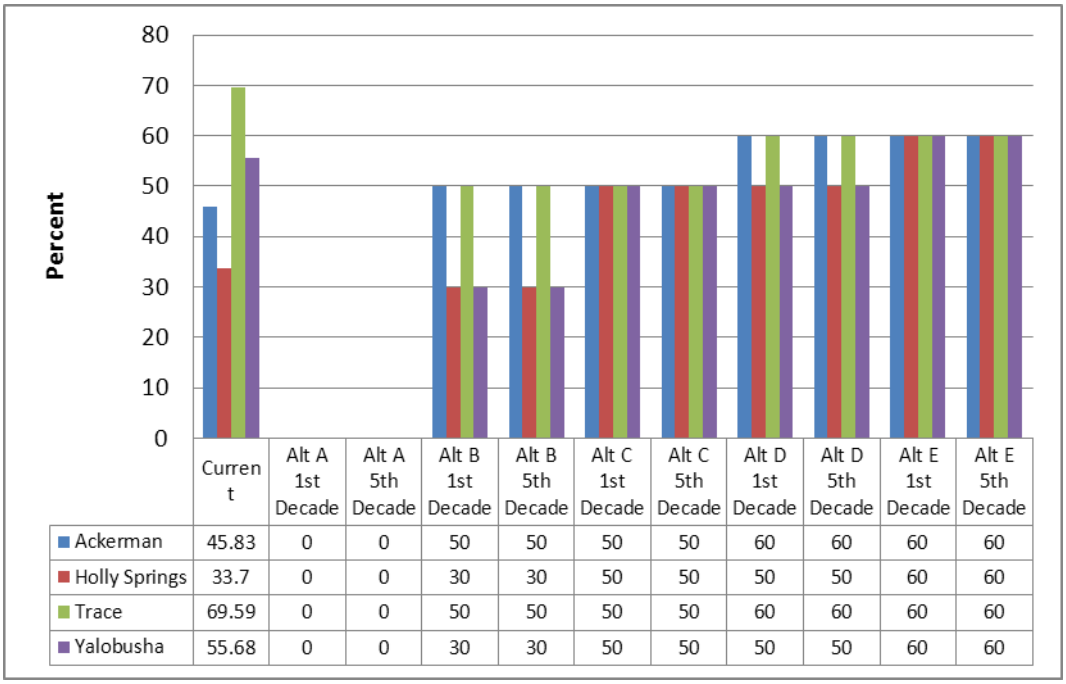
Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Fair	2.00	Fair	Good	Good	Fair	Good	Fair	Fair	Fair	Fair
	2.05	2.00	2.00	2.57	2.69	2.23	2.80	2.34	2.46	2.46	2.11
Holly Springs	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good
	2.33	2.11	2.11	2.34	2.34	2.57	2.69	2.57	2.69	2.34	2.57
Trace	Fair	Fair	Fair	Fair	Good	Fair	Good	Fair	Good	Fair	Fair
	2.23	2.06	2.06	2.48	2.61	2.30	2.91	2.42	2.55	2.48	2.18
Yalobusha	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good
	2.29	2.15	2.15	2.35	2.38	2.53	2.76	2.65	2.76	2.38	2.62

The primary key attributes and corresponding actions to assure the ecological sustainability are as follows:

- Percent acres burned at the desired interval and seasonality/intensity (Figure H 22).

- Percent acres in appropriate system type (including acres restored from previously converted system types) (Figure H 23)
- Percent of occurrences in mature condition (Figure H 24)

Northern dry upland hardwoods are generally intermingled among the dominant pine ecosystems. As a result, this system will be exposed to prescribed fire with the same frequency and seasonality/intensity. Because this system burns less readily than the surrounding pine dominated systems, it is difficult to predict whether or not upland hardwoods will actually burn when exposed to fire. While it is fairly easy to predict interval of fire exposure, the actual burn rates may vary. It is especially difficult to predict seasonality/intensity due to the differences in ground cover moisture regimes between upland hardwoods and surrounding pine systems. It is considered natural and an ecologically appropriate attribute of fire behavior for embedded hardwood communities to burn at rates lower than fire exposure rates. Figure H 22 shows exposure to fire at desired interval by alternative and unit. Due to the challenges described above, fire frequency/seasonality cannot be predicted with confidence and is not shown. Alternative A includes no prescribed fire for this ecosystem. Alternative B meets the lower end of "fair" on the Holly Springs and Yalobusha units while meeting the upper end of "fair" on the Ackerman and Trace units concerning burn interval. Alternative C allows for increased fire frequency compared to the latter alternatives but only reaches the upper end of "fair" value. Alternative D meets the upper end of "fair" on the Holly Springs and Yalobusha units while meeting "good" on the Ackerman and Trace units concerning burn interval. Alternative E meets "good" on all units.



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Ackerman	45.83	0	0	50	50	50	50	60	60	60	60
Holly Springs	33.7	0	0	30	30	50	50	50	50	60	60
Trace	69.59	0	0	50	50	50	50	60	60	60	60
Yalobusha	55.68	0	0	30	30	50	50	50	50	60	60

Figure H 22. Percent of northern dry upland hardwood forest exposed to fire at desired interval by alternative and unit

Alternative A shows a "poor" rating even after the 5th decade for percent of suitable acres occupied by appropriate ecosystem in Figure H 23 below. Alternatives B, C, and E reach a "fair" rating by the 5th decade of each while alternative D reaches a "good" rating in the Trace and Ackerman units in the 5th decade. The reasoning behind this system not reaching a sustainable level across all units by alternative for the most part is due to Forest priorities of upland longleaf restoration and management of threatened and endangered species which are not associated with this system.

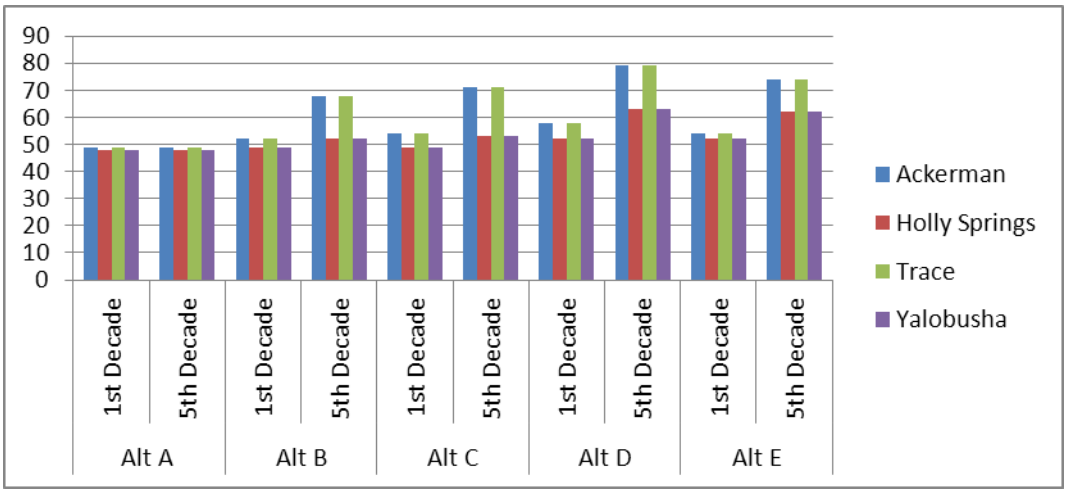


Figure H 23. Percent of northern dry upland hardwood forest in appropriate system by alternative and unit

The amount of mature forest in this ecosystem is an important attribute that demonstrates the amount of age structure distribution of the ecosystem (Figure H 24). All alternatives are in "poor" condition in the 1st decade for all units. Alternative A continues to increase in percent mature forest in the 5th decade which increases the "poor" rating. This is due to no management of this ecosystem in this alternative. Alternatives B, D, and E all reach a "fair" attribute rating by the 5th decade while alternative C reaches a "very good" rating in the Ackerman and Trace units showing sustainability of this attribute while the Yalobusha and Holly Springs units only reach a "fair" rating.

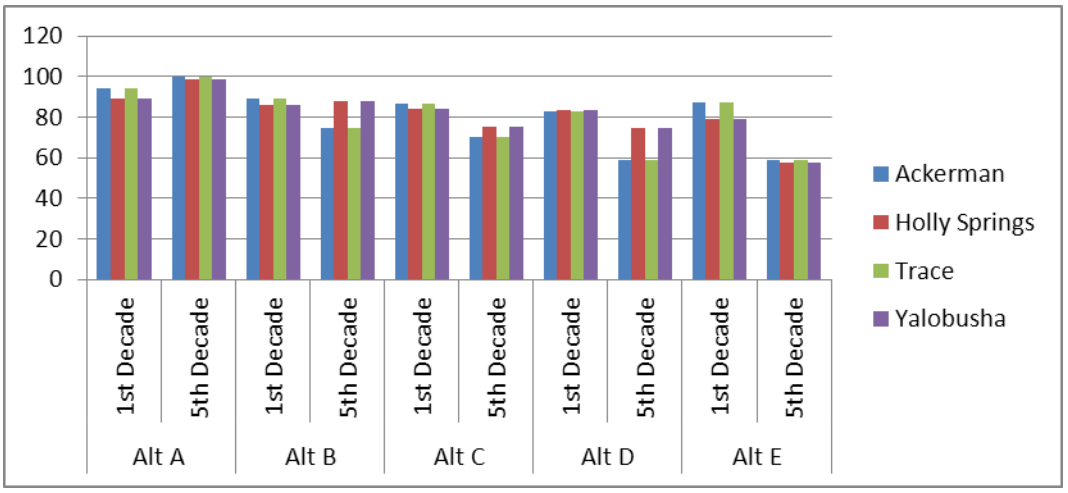


Figure H 24. Percent of northern dry upland hardwood forest in mature forest

H.1.6 Southern Dry Upland Hardwood Forest

As shown in Figure H 25 and Table H 6, all alternative scores by decade remain with a "good" overall ecological sustainability evaluation score despite little management due to few management needs for this system.

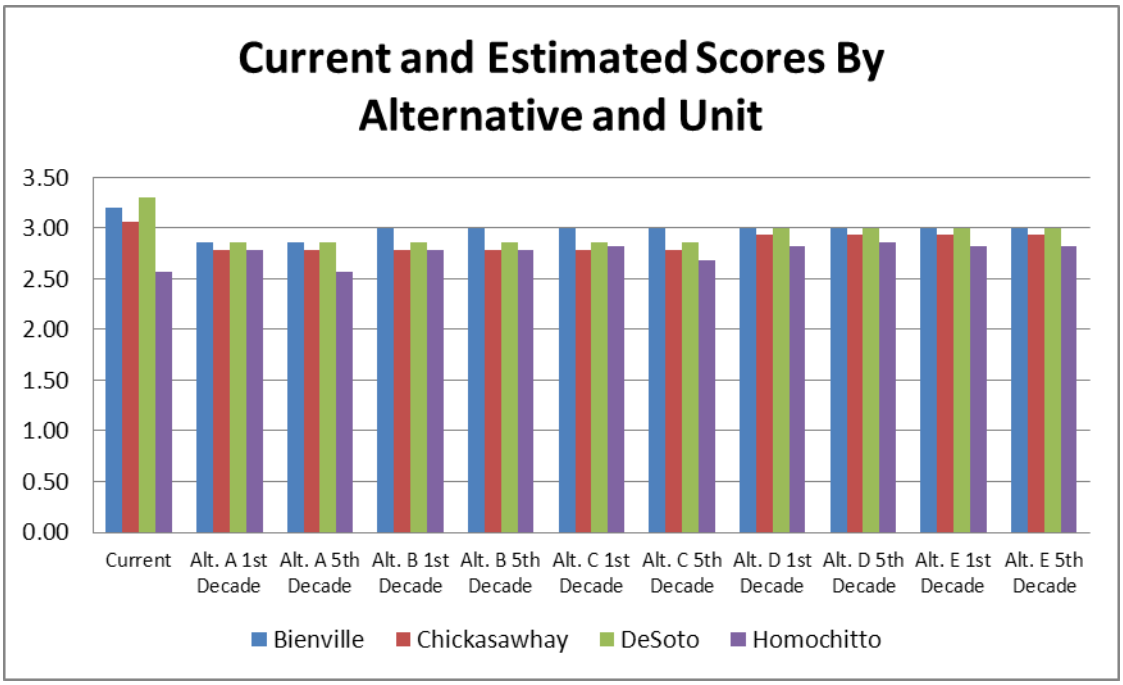


Figure H 25. Southern dry upland hardwood forest ecological sustainability evaluation scores by alternative and unit

Table H 6. Southern dry upland hardwood forest ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Bienville	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.20	2.86	2.86	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Chickasawhay	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.06	2.79	2.79	2.79	2.79	2.79	2.79	2.93	2.93	2.93	2.93
De Soto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.30	2.86	2.86	2.86	2.86	2.86	2.86	3.00	3.00	3.00	3.00
Homochitto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.57	2.79	2.57	2.79	2.79	2.82	2.68	2.82	2.86	2.82	2.82
Bienville	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.94	2.75	2.54	2.75	2.54	2.75	2.54	2.75	2.72	2.86	2.64

The primary key attributes and corresponding actions to assure the ecological sustainability are as follows:

- Percent acres in appropriate system type (including acres restored from previously converted system types) (Figure H 26)

As seen in Figure H 26, the percent of southern dry upland hardwood forest in appropriate system does not change in each unit by alternative and time. This ecosystem is not the highest priority to restore to appropriate system on the Forests. The Bienville, Chickasawhay, and De Soto units are all rated "very

good" for this attribute. The Homochitto will remain poor concerning percent of ecosystem in appropriate system due to priority on this unit is upland longleaf restoration.

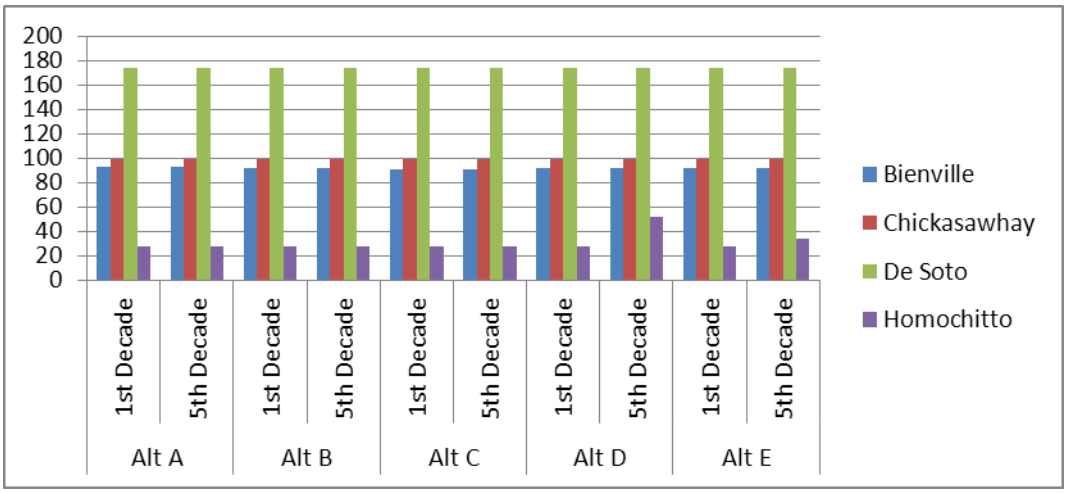


Figure H 26. Percent of southern dry upland hardwood forest at appropriate system by alternative and unit

H.1.7 Southern Mesic Slope Forest

As shown in Figure H 27 and Table H 7, all alternative scores by decade remain with a "good" overall ESE score despite little management due to few management needs for this system.

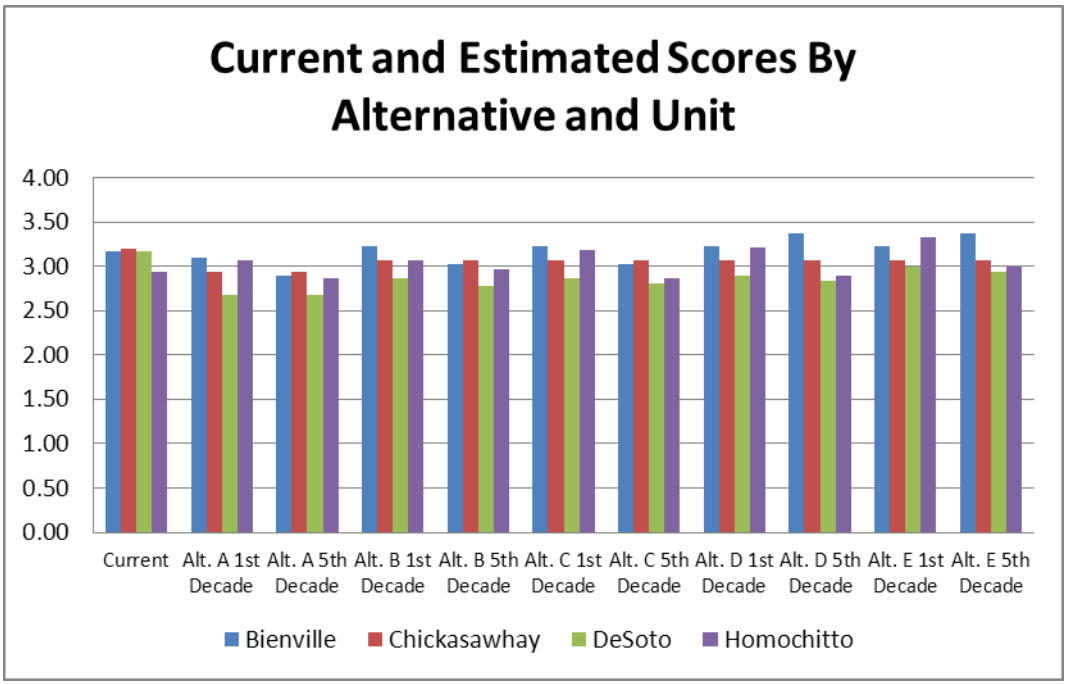


Figure H 27. Southern mesic slope forest ecological sustainability evaluation scores by alternative and unit

Table H 7. Southern mesic slope forest ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Bienville	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.17	3.10	2.90	3.23	3.03	3.23	3.03	3.23	3.37	3.23	3.37
Chickasawhay	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.20	2.93	2.93	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07
De Soto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.17	2.67	2.67	2.87	2.77	2.87	2.80	2.90	2.83	3.00	2.93
Homochitto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.94	3.07	2.86	3.07	2.96	3.18	2.86	3.21	2.89	3.32	3.00

The primary key attribute and corresponding action to assure ecological sustainability for this ecosystem is percent acres in appropriate system type (including acres restored from previously converted system types) (Figure H 28).

As seen in Figure H 28, the ratings for percent of southern mesic slope forest in appropriate system do not change from "fair" on the Chickasawhay and Homochitto units by alternative and time. This ecosystem is not a high priority to restore to appropriate system on these units. This attribute remains "poor" in alternatives A and B on the De Soto unit and becomes "fair" in alternatives C, D, and E which can be attributed to conversion from slash pine forest to appropriate systems in the latter alternatives. On the Bienville unit, alternatives A, B, and C are all rated as "good" for each time interval because the system on this unit is already in "good" condition and no change is expected. Alternatives D and E become "very good" through time since both alternatives are driven by increased restoration and/or increased timber management.

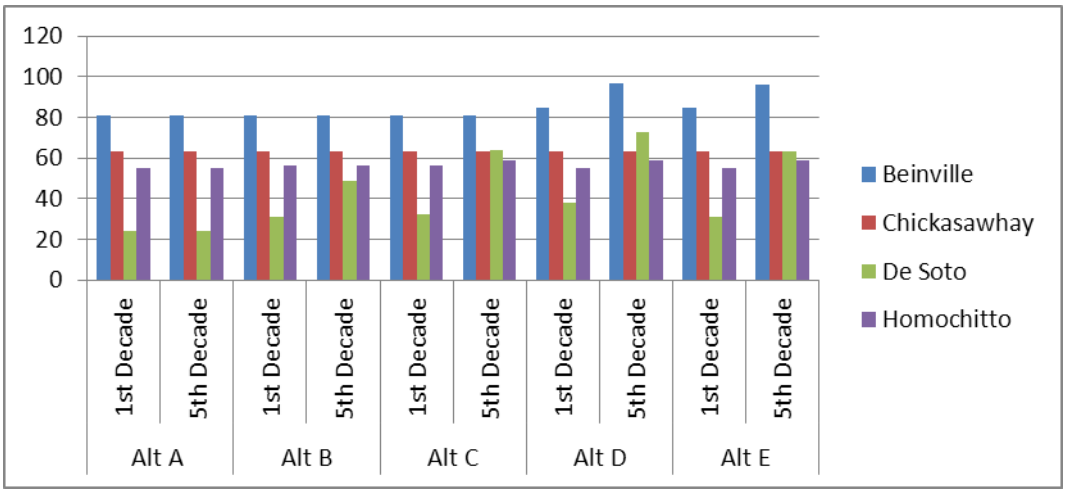


Figure H 28. Percent of southern mesic slope forest at appropriate system by alternative and unit

H.1.8 Northern Mesic Hardwood Forest

As shown in Figure H 29 and Table H 8, all alternative scores by decade remain with a "good" overall ecological sustainability evaluation score despite little management due to few management needs for this system.

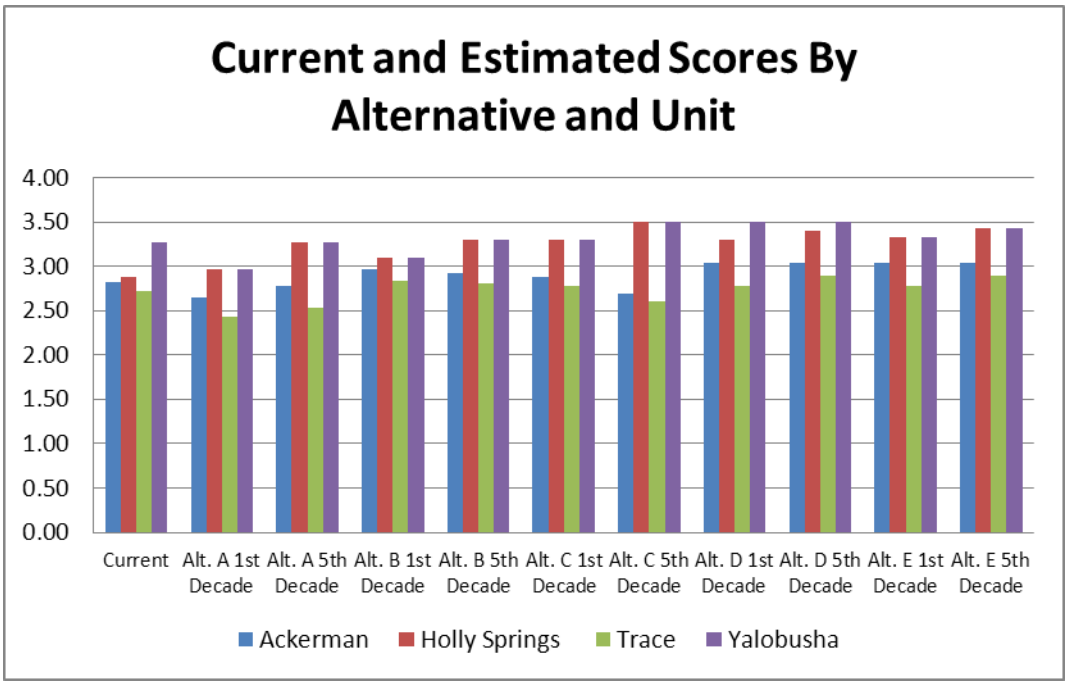


Figure H 29. Northern mesic hardwood forest ecological sustainability evaluation scores by alternative and unit

Table H 8. Northern mesic hardwood forest ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.82	2.65	2.77	2.96	2.92	2.88	2.69	3.04	3.04	3.04	3.04
Holly Springs	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.88	2.97	3.27	3.10	3.30	3.30	3.50	3.30	3.40	3.33	3.43
Trace	Good	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.72	2.43	2.53	2.83	2.80	2.77	2.60	2.77	2.90	2.77	2.90
Yalobusha	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.27	2.97	3.27	3.10	3.30	3.30	3.50	3.50	3.50	3.33	3.43

The primary key attribute and corresponding action to assure ecological sustainability for this ecosystem is percent acres in appropriate system type (including acres restored from previously converted system types) (Figure H 30).

As seen in Figure H 30, the ratings for percent of northern mesic slope forest in appropriate system do not change from “poor” in alternative A while changes are seen with this attribute to “fair” in alternatives B, C, D, and E on the Ackerman and Trace units in the 5th decade. This attribute remains “very good” in all alternatives on the Holly Springs and Yalobusha units through time since the percent of this system in appropriate acres goals have already been reached and will not significantly change by alternative and time.

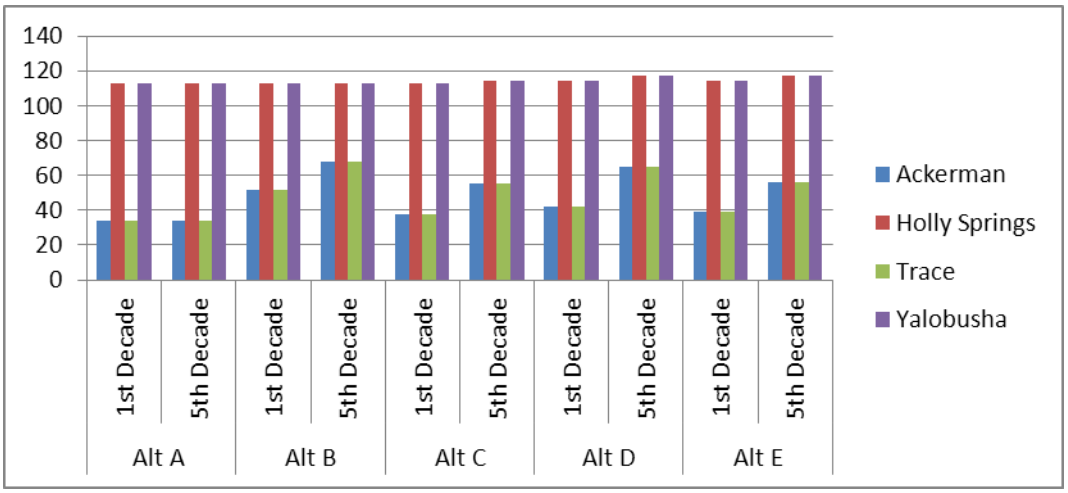


Figure H 30. Percent of northern mesic slope forest at appropriate system by alternative and unit

H.1.9 Floodplain Forest

As shown in Figure H 31 and Table H 9, all alternative scores by decade remain with a "good" overall ecological sustainability evaluation score despite little management due to few management needs for this system.

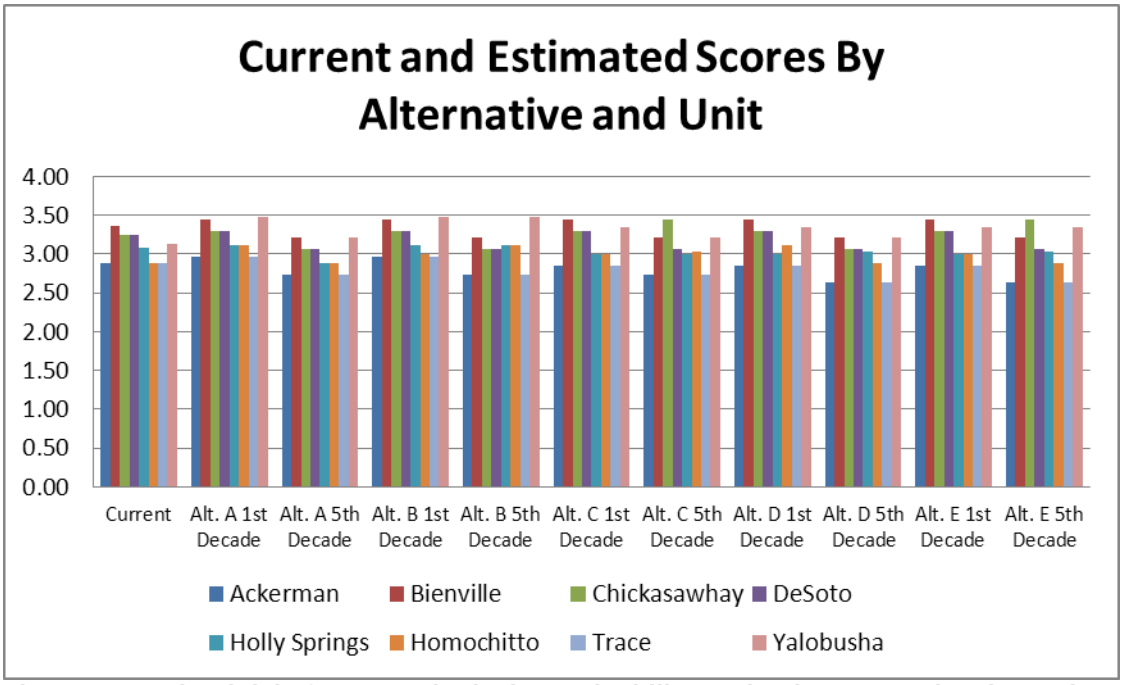


Figure H 31. Floodplain forest ecological sustainability evaluation scores by alternative and unit

Table H 9. Floodplain forest ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.88	2.96	2.74	2.96	2.74	2.85	2.74	2.85	2.63	2.85	2.63
Bienville	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.36	3.44	3.22	3.44	3.22	3.44	3.22	3.44	3.22	3.44	3.22
Chickasawhay	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.24	3.30	3.07	3.30	3.07	3.30	3.44	3.30	3.07	3.30	3.44
De Soto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.24	3.30	3.07	3.30	3.07	3.30	3.07	3.30	3.07	3.30	3.07
Holly Springs	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.08	3.11	2.89	3.11	3.11	3.00	3.00	3.00	3.04	3.00	3.04
Homochitto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.89	3.11	2.89	3.00	3.11	3.00	3.04	3.11	2.89	3.00	2.89
Trace	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.88	2.96	2.74	2.96	2.74	2.85	2.74	2.85	2.63	2.85	2.63
Yalobusha	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.13	3.48	3.22	3.48	3.48	3.35	3.22	3.35	3.22	3.35	3.35

The primary key attribute and corresponding action to assure ecological sustainability for this ecosystem is percent acres in appropriate system type (including acres restored from previously converted system types) (Figure H 32).

As seen in Figure H 32, the ratings for percent of floodplain forest in appropriate system do not change from “poor” in all alternatives on the Ackerman, De Soto, and Trace units and remain “fair” on the Bienville for all alternatives. These units show no change by alternative because floodplain forest restoration is not a priority for these units. On the Holly Springs and Yalobusha units, this attribute remains at “poor” in alternatives A, B, and C while and becomes “fair” condition in alternatives D and E which shows that some offsite pine will be restored to this ecosystem in these accelerated restoration and enhanced forest health alternatives. Alternative C shows changes in the Homochitto and Chickasawhay units from “poor” to “fair” which is expected with the all of the offsite pine being restored to natural systems. The Homochitto unit also shows a rating of “fair” in alternative D for the same reason. Since priorities are to restore offsite pine to appropriate systems in alternatives C, D, and E and to some extent in alternative B, this ecosystem is not expected to change much in relation to this attribute in the next half century.

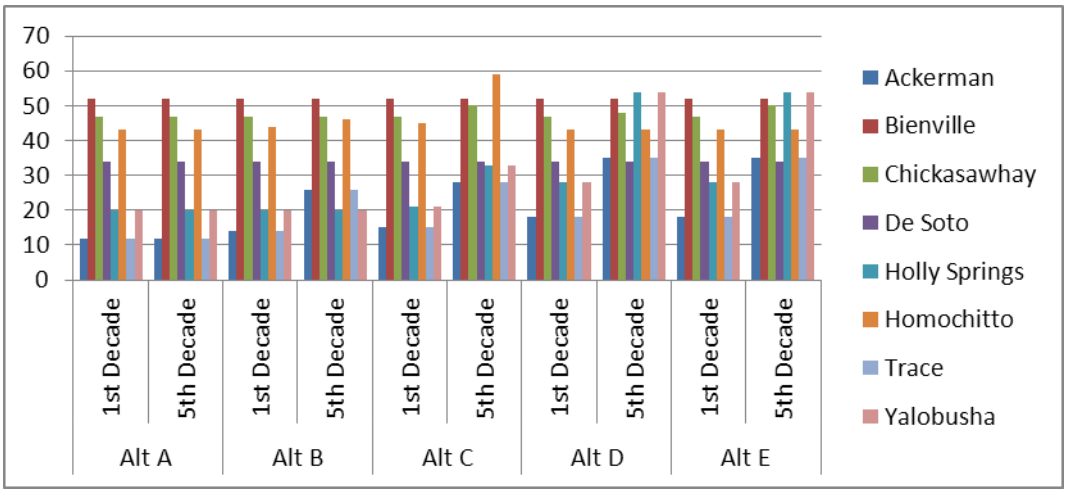
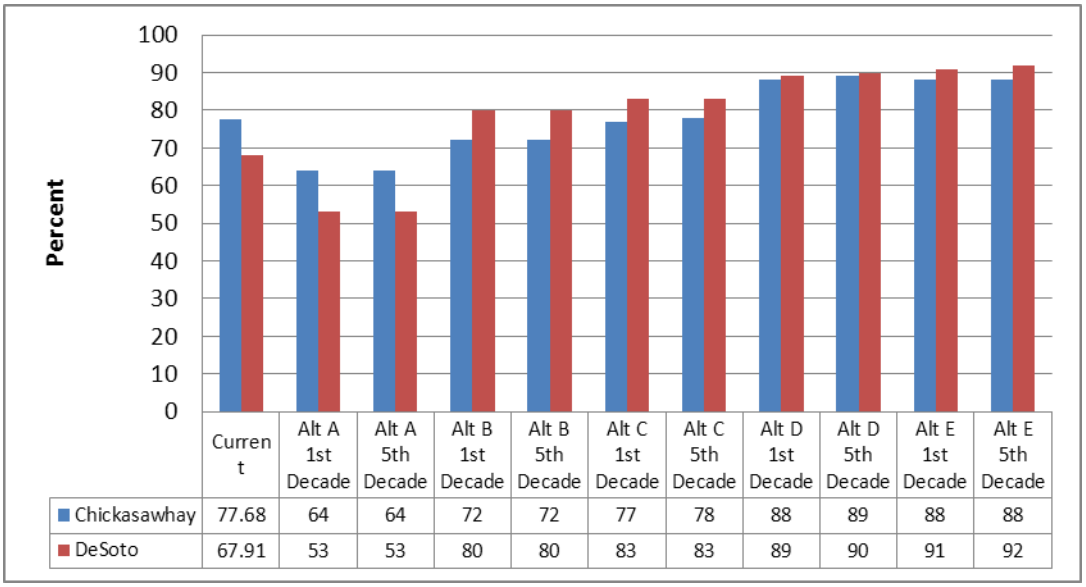


Figure H 32. Percent of floodplain forest at appropriate system by alternative and unit

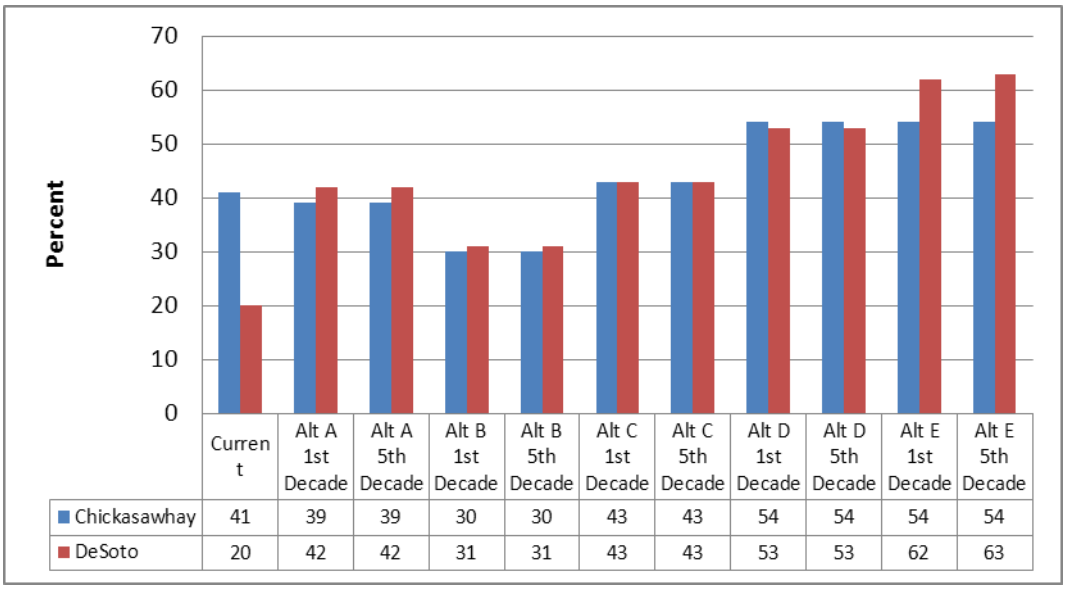
H.1.10 Xeric Sandhills

Figure H 33 and Figure H 34 show fire regime variables by alternative. Herbaceous dominated understories, including grasses and forbs, are important attributes of healthy longleaf ecosystems best achieved by the application of frequent growing season fire, ideally once every 1 to 3 years (desired interval). These data show that both fire frequency and seasonality/intensity, in most cases, are well within the "good" to "very good" range and increase respectively from alternatives C thru E.



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Chickasawhay	77.68	64	64	72	72	77	78	88	89	88	88
DeSoto	67.91	53	53	80	80	83	83	89	90	91	92

Figure H 33. Percent of xeric sandhills burned at desired interval by alternative and unit



	Current	Alt A 1st Decade	Alt A 5th Decade	Alt B 1st Decade	Alt B 5th Decade	Alt C 1st Decade	Alt C 5th Decade	Alt D 1st Decade	Alt D 5th Decade	Alt E 1st Decade	Alt E 5th Decade
Chickasawhay	41	39	39	30	30	43	43	54	54	54	54
DeSoto	20	42	42	31	31	43	43	53	53	62	63

Figure H 34. Percent of xeric sandhills burned in the growing season by alternative and unit

H.1.11 Cypress Dominated Wetlands

All overall ecological sustainability evaluation scores were calculated as "good" for this system for all alternatives and all time intervals (Figure H 35 and Table H 10). There are many data needs for this system including location and size of this system across the Forests.

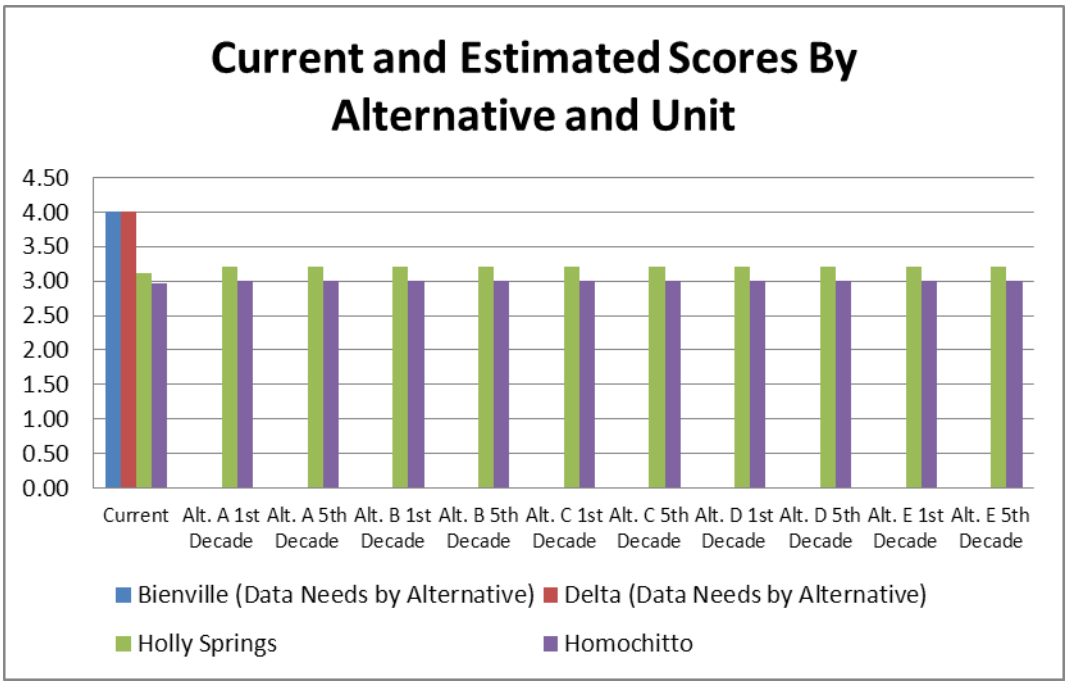


Figure H 35. Cypress dominated wetlands ecological sustainability evaluation scores by alternative and unit

Table H 10. Cypress dominated wetlands ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Bienville	4.00	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need
Delta	4.00	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need
Holly Springs	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.12	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
Homochitto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.97	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

H.1.12 Seeps, Springs, and Seepage Swamps

Ecological sustainability evaluation scores were calculated as "good" for all alternatives and all time intervals where data was available among units and rated as "good" and "very good" with no differences for each between alternatives (Table H 11). There are many data needs for this system including location and size of this system across the Forests.

Table H 11. Seeps, springs, and seepage swamps ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	1.00	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need
Bienville	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.74	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Chickasawhay	Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
	3.12	3.56	3.56	3.56	3.56	3.56	3.56	3.56	3.56	3.56	3.56
De Soto	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
	3.59	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Holly Springs	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.86	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94
Homochitto	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.36	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12
Trace	2.80	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need
Yalobusha	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.87	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12

H.1.13 Herbaceous Seepage Bogs and Flats

Ecological sustainability evaluation scores were calculated as "good" with no differences between alternatives and time intervals where data was available (Table H 12). There are many data needs for this system including location and size of this system across the Forests.

Table H 12. Herbaceous seepage bogs and flats ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Chickasawhay	2.71	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need
De Soto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.80	2.91	2.91	3.26	3.26	3.26	3.26	3.39	3.39	3.39	3.39

Figure H 36 and Figure H 37 show fire regime variables by alternative. Open canopy and herbaceous dominated under-stories, including grasses and forbs, are important attributes of healthy herbaceous seepage bogs and flats best achieved by the application of frequent fire, ideally once every 1 to 3 years (desired interval). Figure H 36 shows that fire frequency is well within the "very good" range in alternatives B thru E while alternative A only reaches "fair."

Prescribed fire, as stated previously, plays an integral part of restoring this ecosystem. Growing season prescribed fire (Figure H 37) differs between alternatives. Alternatives A, B and C score "fair" although the actual value of alternative C (40 percent) does meet minimum desired condition. Both alternatives D and E obtain a "good" rating for this attribute.

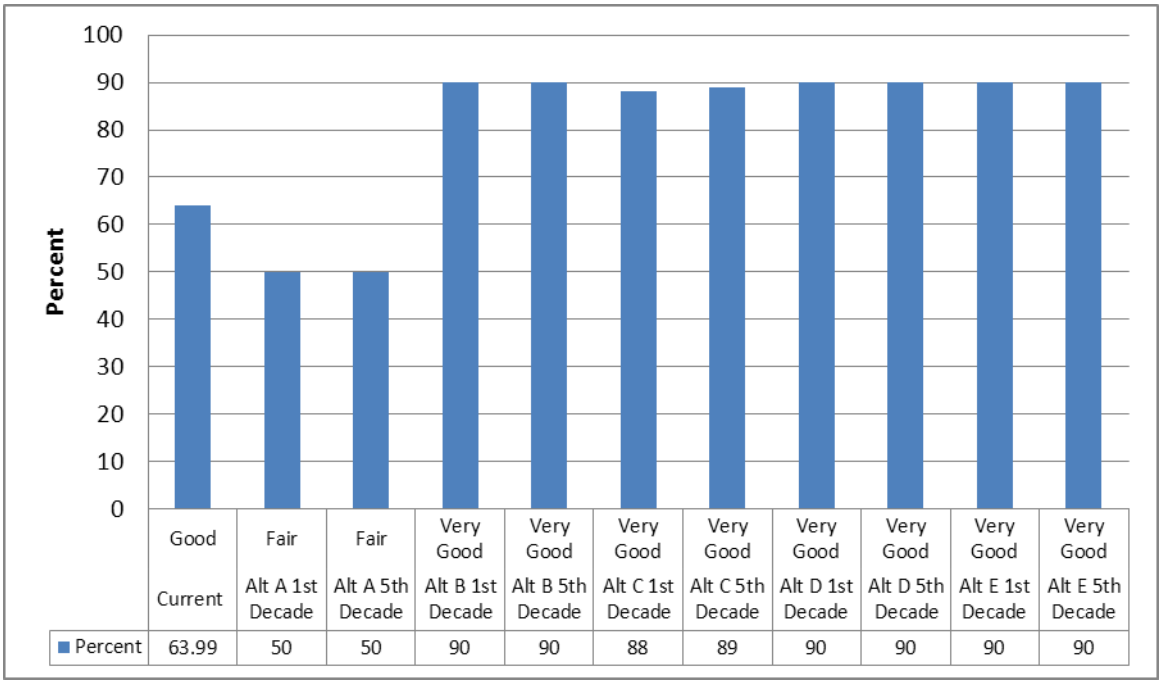


Figure H 36. Percent of herbaceous seepage bogs and flats burned at desired interval by alternative

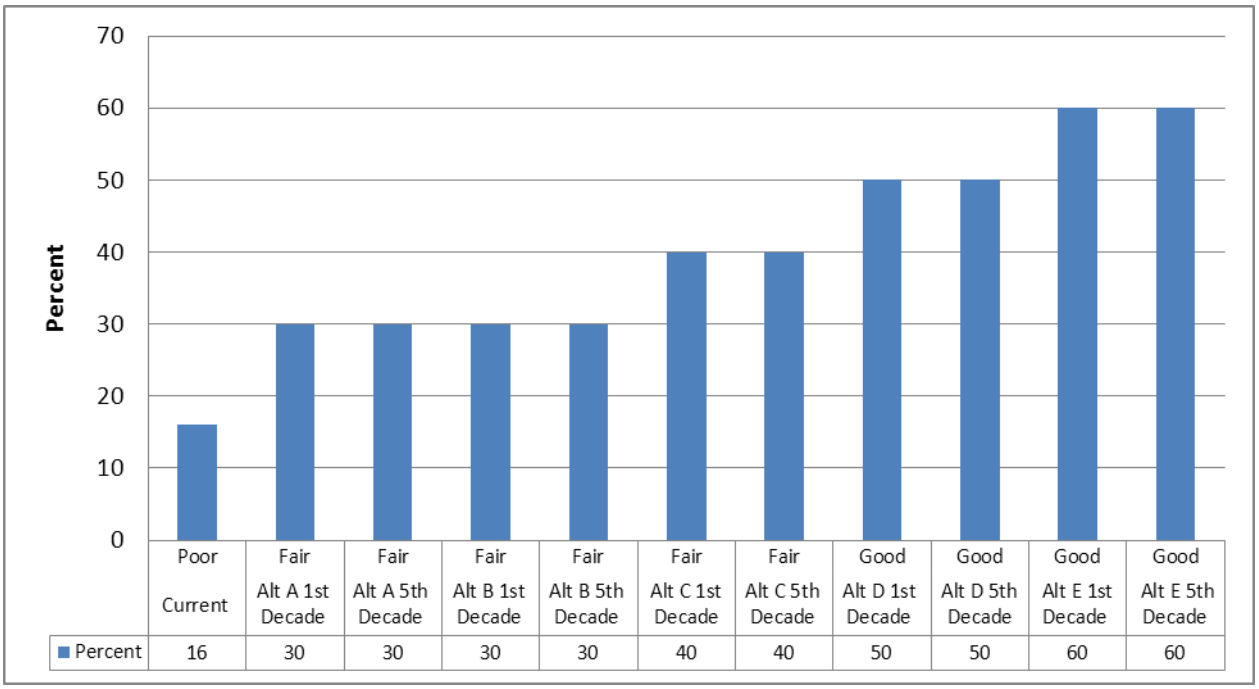


Figure H 37. Percent of herbaceous seepage bogs and flats burned in the growing season by alternative

H.2 Species Groups and Associations

H.2.1 Herbaceous Seepage Bogs and Flats Associates

Table H 13. Herbaceous seepage bogs and flats associates ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Chickasawhay	2.71	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need	Data Need
De Soto	2.78	2.80	2.80	3.20	3.20	3.20	3.20	3.40	3.40	3.40	3.40

H.2.2 Mature Mesic Deciduous Forest Associates

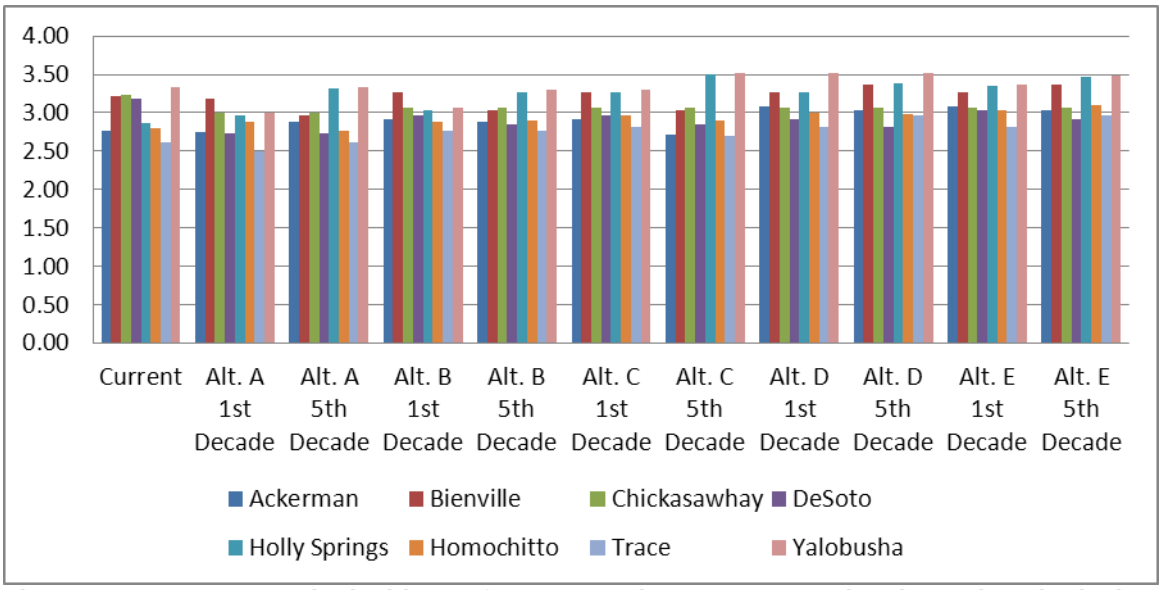


Figure H 38. Mature mesic deciduous forest associates current and estimated ecological sustainability evaluation scores by unit and alternative

Table H 14. Mature mesic deciduous forest associates ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.77	2.75	2.88	2.92	2.88	2.92	2.71	3.08	3.04	3.08	3.04
Bienville	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.21	3.19	2.96	3.26	3.04	3.26	3.04	3.26	3.37	3.26	3.37
Chickasawhay	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.24	3.00	3.00	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07
De Soto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.18	2.73	2.73	2.96	2.85	2.96	2.85	2.92	2.81	3.04	2.92
Holly Springs	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.86	2.96	3.31	3.04	3.27	3.27	3.50	3.27	3.38	3.35	3.46
Homochitto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.79	2.88	2.77	2.88	2.90	2.96	2.90	3.00	2.98	3.04	3.10
Trace	Good	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.61	2.50	2.62	2.77	2.77	2.81	2.69	2.81	2.96	2.81	2.96
Yalobusha	Good	Good	Good	Good	Good	Good	Very Good	Very Good	Very Good	Good	Good
	3.34	3.00	3.33	3.07	3.30	3.30	3.52	3.52	3.52	3.37	3.48

H.2.3 Mature Open Pine Grass Associates

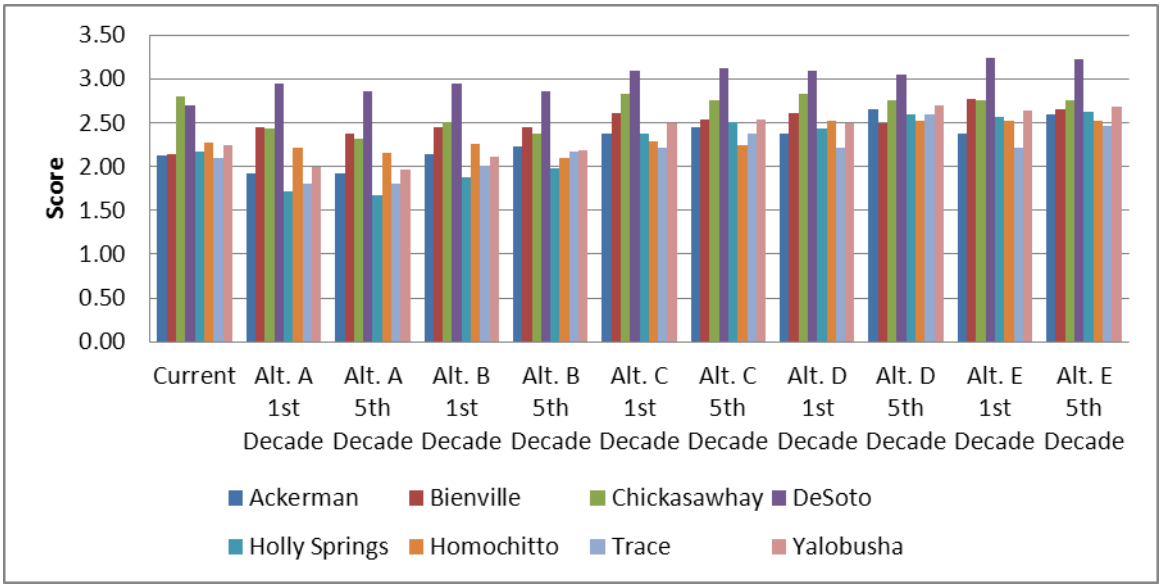


Figure H 39. Mature open pine-grass associates current and estimated ecological sustainability evaluation scores by unit and alternative

Table H 15. Mature open pine-grass associates ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fair	Good
	2.12	1.92	1.92	2.14	2.23	2.37	2.45	2.37	2.65	2.37	2.59
Bienville	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Fair	Good	Good
	2.14	2.45	2.37	2.45	2.45	2.61	2.53	2.61	2.49	2.77	2.65
Chickasawhay	Good	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Good	Good
	2.80	2.44	2.32	2.50	2.38	2.83	2.75	2.83	2.75	2.75	2.75
De Soto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.69	2.94	2.86	2.94	2.86	3.09	3.12	3.09	3.05	3.24	3.22
Holly Springs	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Good
	2.17	1.72	1.67	1.87	1.98	2.37	2.50	2.43	2.59	2.57	2.63
Homochitto	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good
	2.27	2.21	2.16	2.26	2.10	2.29	2.24	2.52	2.52	2.52	2.52
Trace	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair
	2.09	1.81	1.81	2.01	2.17	2.21	2.38	2.21	2.59	2.21	2.46
Yalobusha	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fair	Good	Good	Good
	2.25	2.00	1.96	2.11	2.19	2.49	2.53	2.49	2.69	2.64	2.68

H.2.4 Mature Riparian Forest Associates

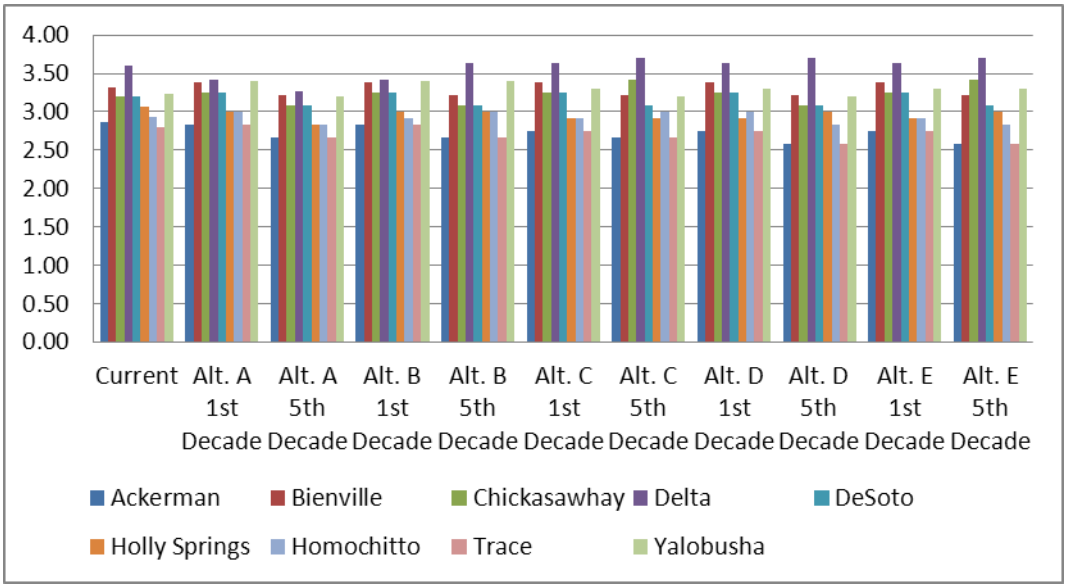


Figure H 40. Mature riparian forest associates current and estimated ecological sustainability evaluation scores by unit and alternative

Table H 16. Mature riparian forest associates ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.86	2.83	2.67	2.83	2.67	2.75	2.67	2.75	2.58	2.75	2.58
Bienville	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.31	3.39	3.22	3.39	3.22	3.39	3.22	3.39	3.22	3.39	3.22
Chickasawhay	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.20	3.25	3.08	3.25	3.08	3.25	3.42	3.25	3.08	3.25	3.42
Delta	Very Good	Good	Good	Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
	3.60	3.41	3.26	3.41	3.63	3.63	3.70	3.63	3.70	3.63	3.70
De Soto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.20	3.25	3.08	3.25	3.08	3.25	3.08	3.25	3.08	3.25	3.08
Holly Springs	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.06	3.00	2.83	3.00	3.00	2.92	2.92	2.92	3.00	2.92	3.00
Homochitto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.93	3.00	2.83	2.92	3.00	2.92	3.00	3.00	2.83	2.92	2.83
Trace	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.80	2.83	2.67	2.83	2.67	2.75	2.67	2.75	2.58	2.75	2.58
Yalobusha	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.23	3.40	3.20	3.40	3.40	3.30	3.20	3.30	3.20	3.30	3.30

H.2.5 Mature Upland Pine-Hardwood Associates

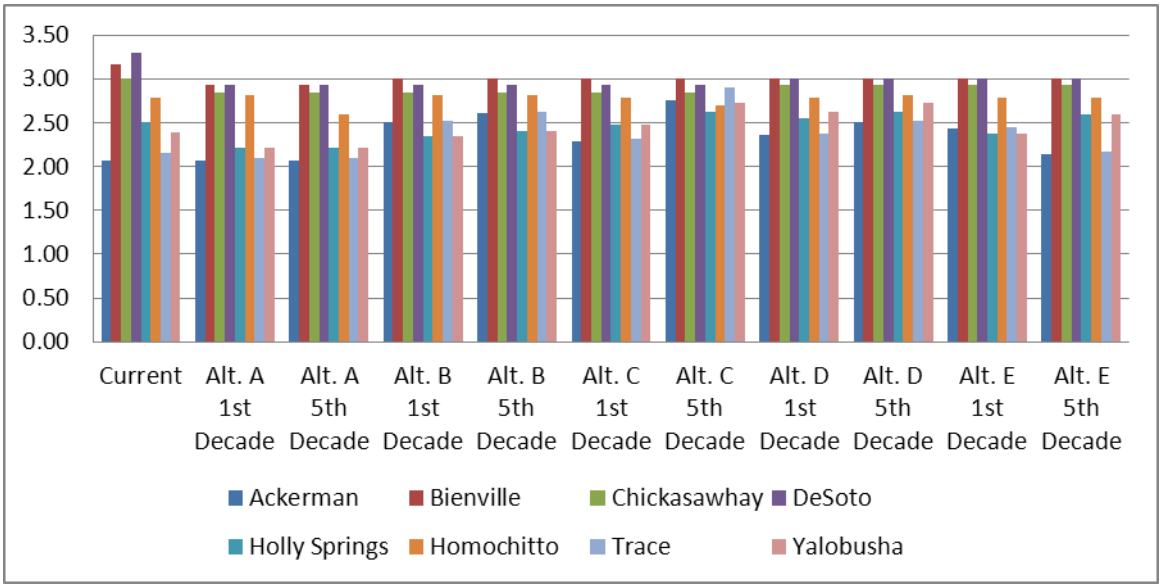


Figure H 41. Mature upland pine-hardwood associates current and estimated ecological sustainability evaluation scores by unit and alternative

Table H 17. Mature upland pine-hardwood associates ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Fair	Fair	Fair	Fair	Good	Fair	Good	Fair	Fair	Fair	Fair
	2.07	2.07	2.07	2.50	2.61	2.29	2.75	2.36	2.50	2.43	2.14
Bienville	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.17	2.93	2.93	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Chickasawhay	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.00	2.85	2.85	2.85	2.85	2.85	2.85	2.93	2.93	2.93	2.93
De Soto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	3.30	2.93	2.93	2.93	2.93	2.93	2.93	3.00	3.00	3.00	3.00
Holly Springs	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Fair	Good
	2.50	2.21	2.21	2.34	2.41	2.48	2.62	2.55	2.62	2.38	2.59
Homochitto	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.79	2.81	2.59	2.81	2.81	2.78	2.70	2.78	2.81	2.78	2.78
Trace	Fair	Fair	Fair	Good	Good	Fair	Good	Fair	Good	Fair	Fair
	2.16	2.10	2.10	2.52	2.62	2.31	2.90	2.38	2.52	2.45	2.17
Yalobusha	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Fair	Good
	2.39	2.21	2.21	2.34	2.41	2.48	2.72	2.62	2.72	2.38	2.59

H.2.6 Prairie Associates

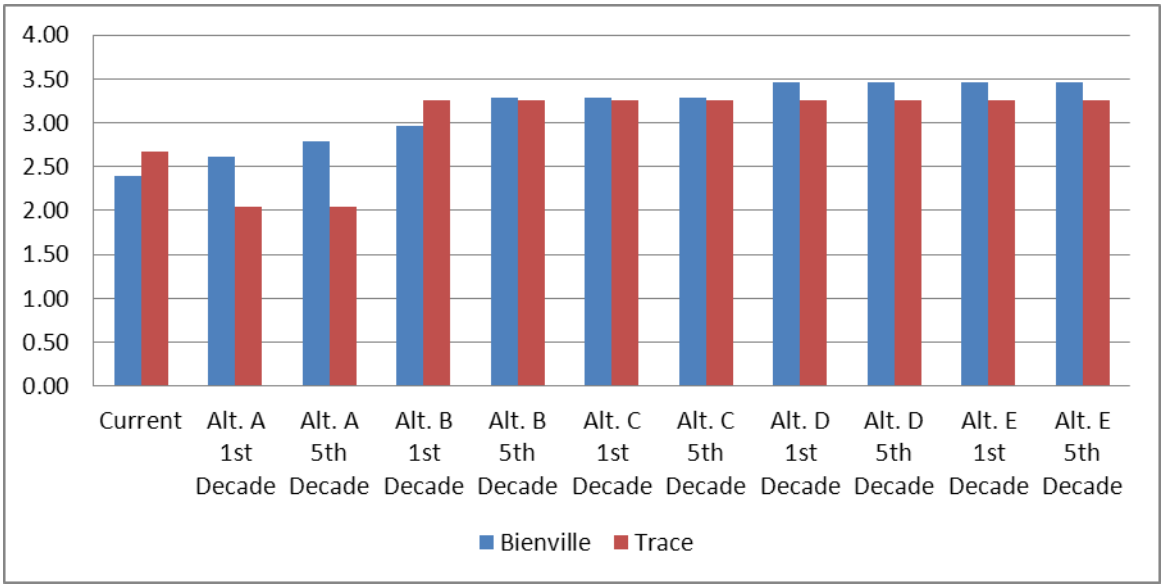


Figure H 42. Prairie associates current and estimated ecological sustainability evaluation scores by unit and alternative

Table H 18. Prairie associates ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Bienville	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.39	2.62	2.79	2.96	3.29	3.29	3.29	3.46	3.46	3.46	3.46
Trace	Good	Fair	Fair	Good	Good	Good	Good	Good	Good	Good	Good
	2.67	2.05	2.05	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25

H.2.7 Seeps, Springs, and Seepage Swamps Associates

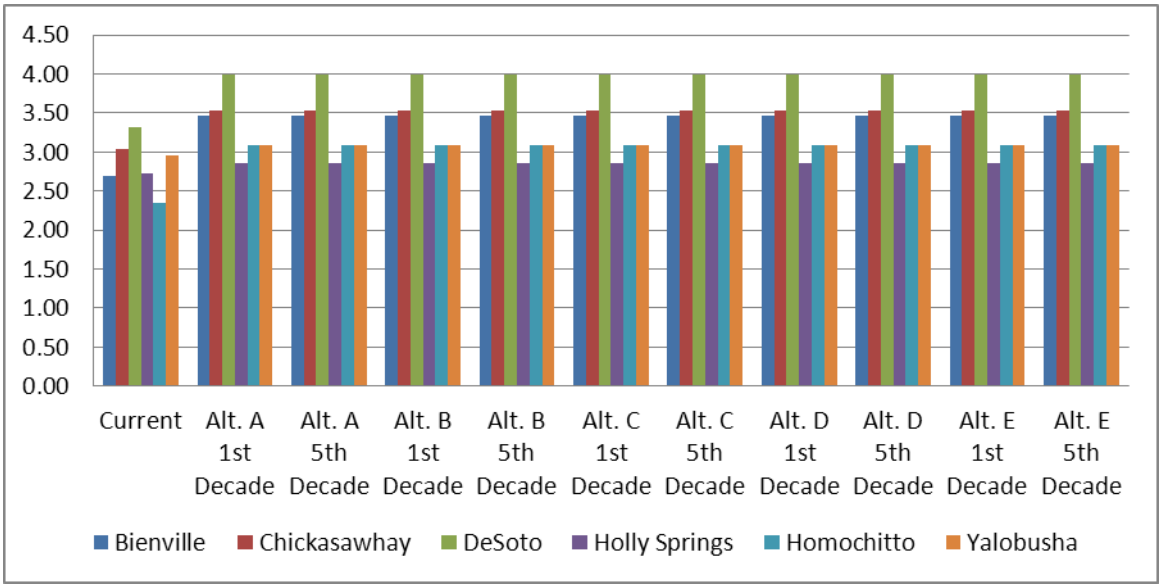


Figure H 43. Seeps, springs and seepage swamps associates current and estimated ecological sustainability evaluation scores by unit and alternative

Table H 19. Seeps, springs and seepage swamps associates ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Bienville	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.70	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46
Chickasawhay	Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
	3.04	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54
De Soto	Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
	3.32	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Holly Springs	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.73	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
Homochitto	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.35	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08
Yalobusha	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.95	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08

H.2.8 Bat Roost Structure Group

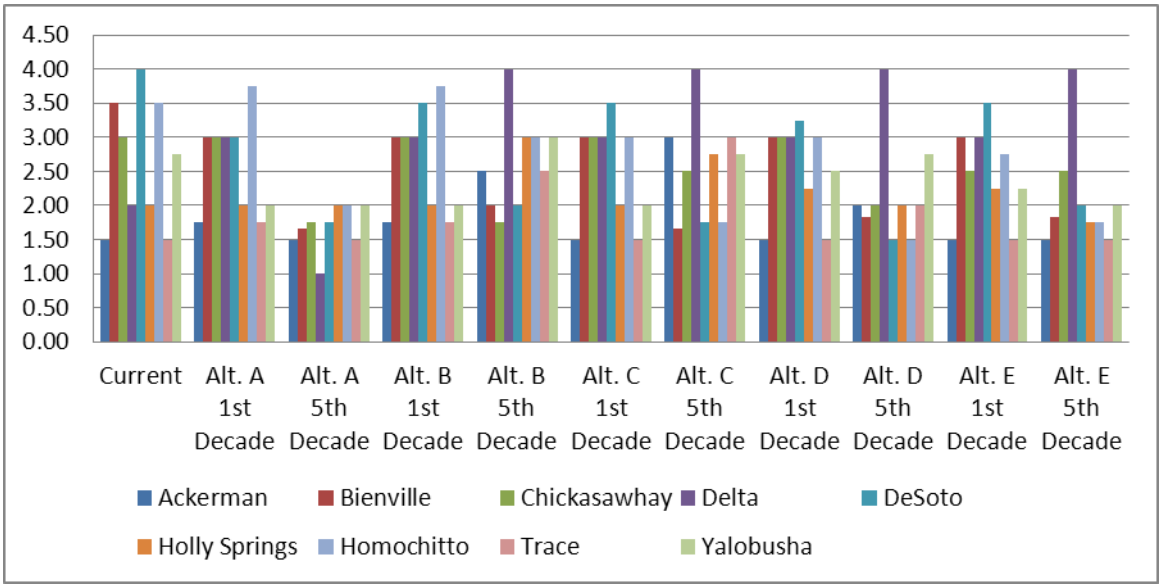


Figure H 44. Bat roost structure group current and estimated ecological sustainability evaluation scores by unit and alternative

Table H 20. Bat roost structure group ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Poor	Fair	Poor	Fair	Fair	Poor	Good	Poor	Fair	Poor	Poor
	1.50	1.75	1.50	1.75	2.50	1.50	3.00	1.50	2.00	1.50	1.50
Bienville	Good	Good	Fair	Good	Fair	Good	Fair	Good	Fair	Good	Fair
	3.50	3.00	1.67	3.00	2.00	3.00	1.67	3.00	1.83	3.00	1.83
Chickasawhay	Good	Good	Fair	Good	Fair	Good	Fair	Good	Fair	Fair	Fair
	3.00	3.00	1.75	3.00	1.75	3.00	2.50	3.00	2.00	2.50	2.50
Delta	Fair	Good	Poor	Good	Very Good	Good	Very Good	Good	Very Good	Good	Very Good
	2.00	3.00	1.00	3.00	4.00	3.00	4.00	3.00	4.00	3.00	4.00
De Soto	Very Good	Good	Fair	Good	Fair	Good	Fair	Good	Poor	Good	Fair
	4.00	3.00	1.75	3.50	2.00	3.50	1.75	3.25	1.50	3.50	2.00
Holly Springs	Fair	Fair	Fair	Fair	Good	Fair	Good	Fair	Fair	Fair	Fair
	2.00	2.00	2.00	2.00	3.00	2.00	2.75	2.25	2.00	2.25	1.75
Homochitto	Good	Very Good	Fair	Very Good	Good	Good	Fair	Good	Poor	Good	Fair
	3.50	3.75	2.00	3.75	3.00	3.00	1.75	3.00	1.50	2.75	1.75
Trace	Poor	Fair	Poor	Fair	Fair	Poor	Good	Poor	Fair	Poor	Poor
	1.50	1.75	1.50	1.75	2.50	1.50	3.00	1.50	2.00	1.50	1.50
Yalobusha	Good	Fair	Fair	Fair	Good	Fair	Good	Fair	Good	Fair	Fair
	2.75	2.00	2.00	2.00	3.00	2.00	2.75	2.50	2.75	2.25	2.00

H.2.9 Den Tree Associates

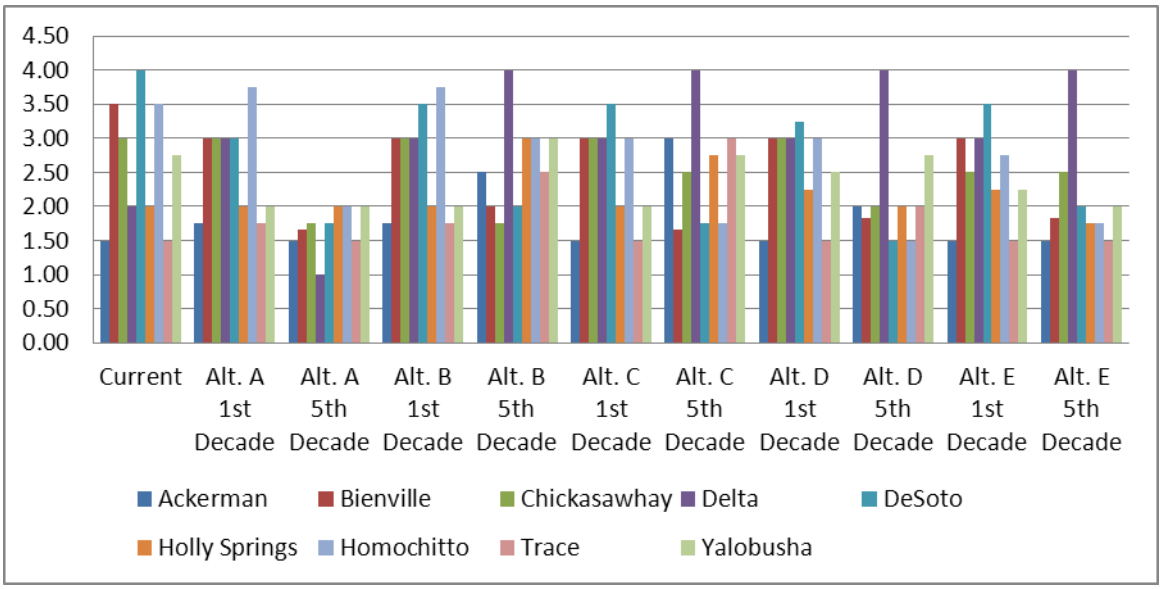
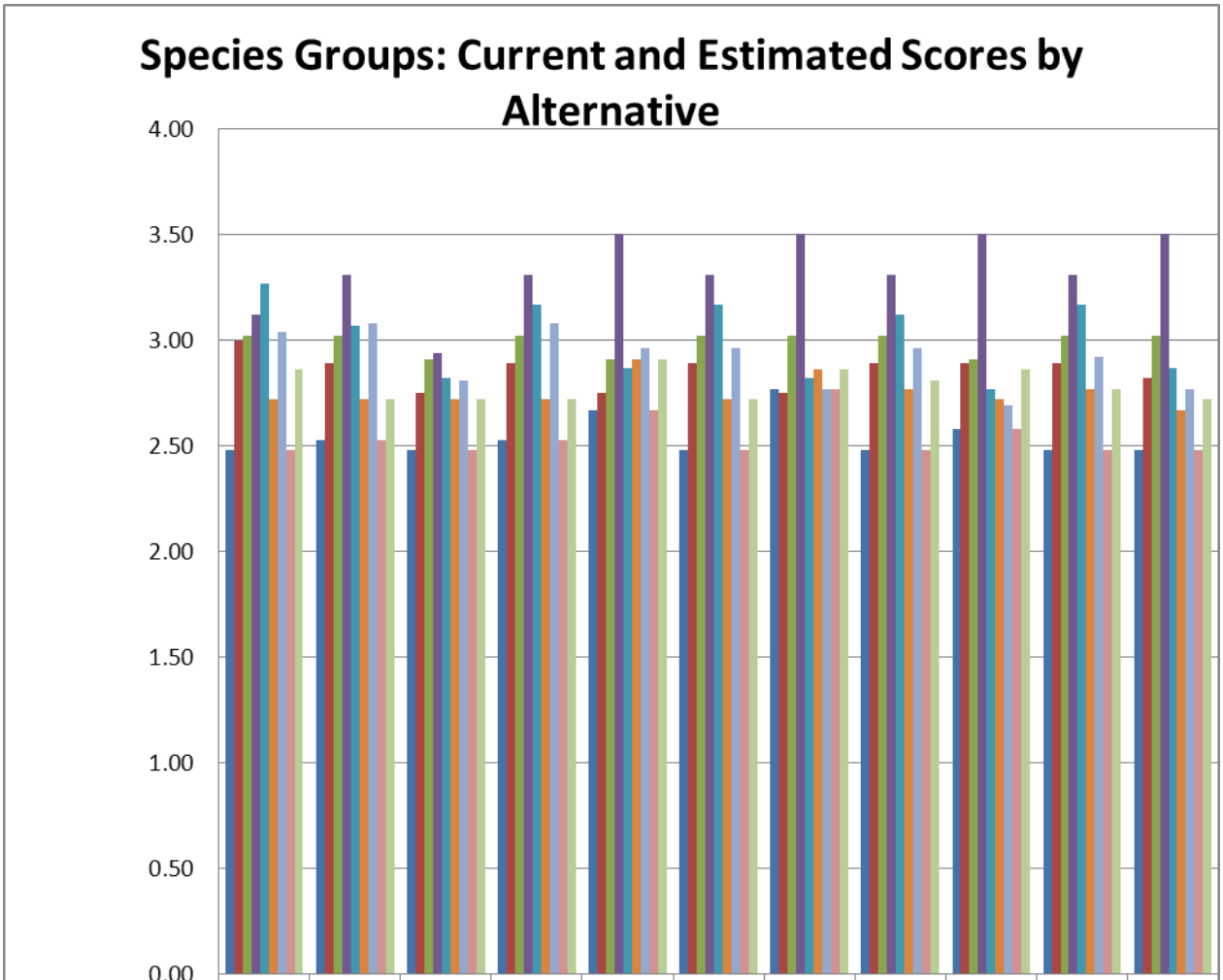


Figure H 45. Den tree associates current and estimated ecological sustainability evaluation scores by unit and alternative

Table H 21. Den tree associates ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Ackerman	Poor	Fair	Poor	Fair	Fair	Poor	Good	Poor	Fair	Poor	Poor
	1.50	1.75	1.50	1.75	2.50	1.50	3.00	1.50	2.00	1.50	1.50
Bienville	Good	Good	Fair	Good	Fair	Good	Fair	Good	Fair	Good	Fair
	3.50	3.00	1.67	3.00	2.00	3.00	1.67	3.00	1.83	3.00	1.83
Chickasawhay	Good	Good	Fair	Good	Fair	Good	Fair	Good	Fair	Fair	Fair
	3.00	3.00	1.75	3.00	1.75	3.00	2.50	3.00	2.00	2.50	2.50
Delta	Fair	Good	Poor	Good	Very Good	Good	Very Good	Good	Very Good	Good	Very Good
	2.00	3.00	1.00	3.00	4.00	3.00	4.00	3.00	4.00	3.00	4.00
De Soto	Very Good	Good	Fair	Good	Fair	Good	Fair	Good	Poor	Good	Fair
	4.00	3.00	1.75	3.50	2.00	3.50	1.75	3.25	1.50	3.50	2.00
Holly Springs	Fair	Fair	Fair	Fair	Good	Fair	Good	Fair	Fair	Fair	Fair
	2.00	2.00	2.00	2.00	3.00	2.00	2.75	2.25	2.00	2.25	1.75
Homochitto	Good	Very Good	Fair	Very Good	Good	Good	Fair	Good	Poor	Good	Fair
	3.50	3.75	2.00	3.75	3.00	3.00	1.75	3.00	1.50	2.75	1.75
Trace	Poor	Fair	Poor	Fair	Fair	Poor	Good	Poor	Fair	Poor	Poor
	1.50	1.75	1.50	1.75	2.50	1.50	3.00	1.50	2.00	1.50	1.50
Yalobusha	Good	Fair	Fair	Fair	Good	Fair	Good	Fair	Good	Fair	Fair
	2.75	2.00	2.00	2.00	3.00	2.00	2.75	2.50	2.75	2.25	2.00

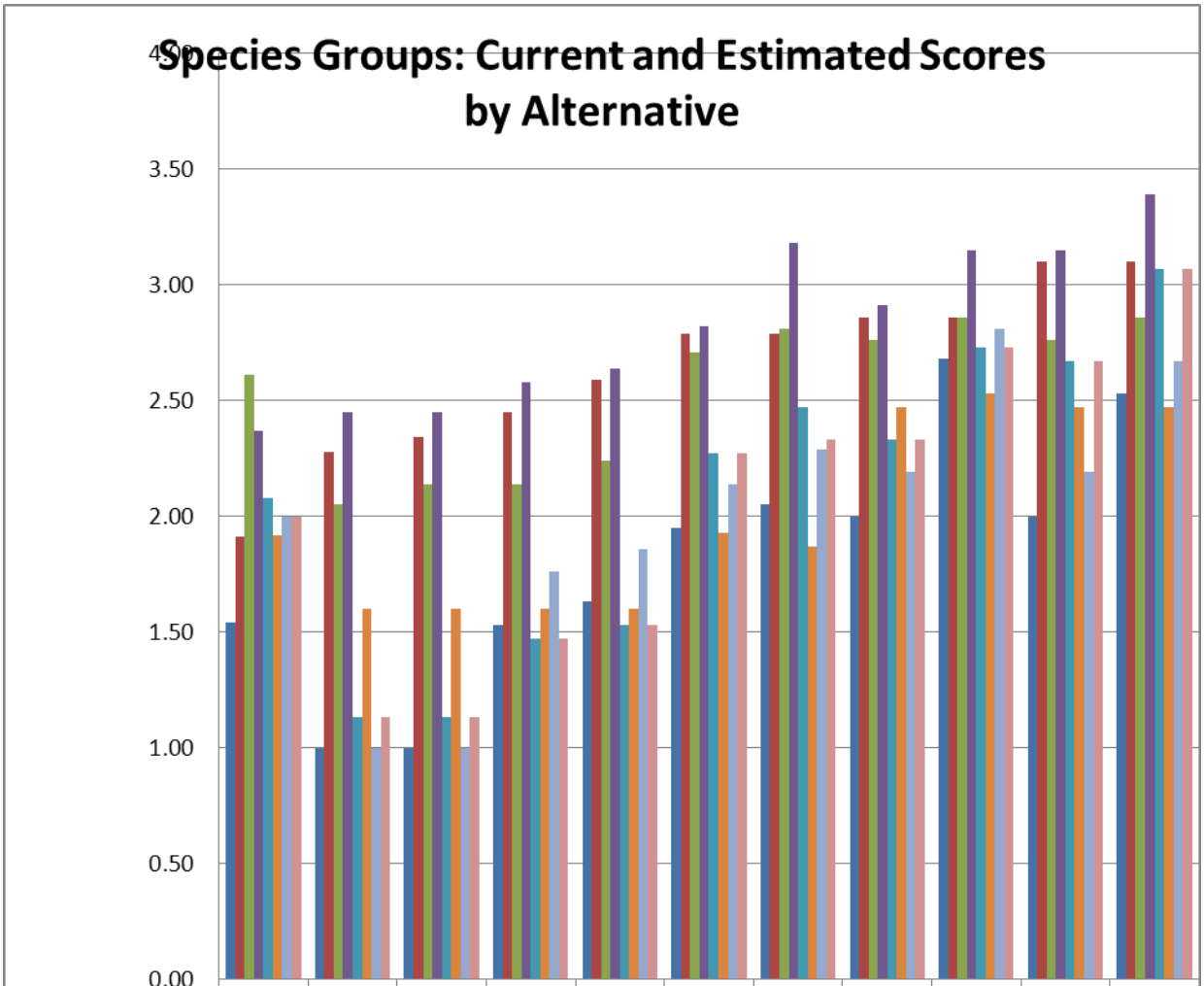
H.2.10 Forest Interior Birds Group



	Current	Alt. A 1st Decade	Alt. A 5th Decade	Alt. B 1st Decade	Alt. B 5th Decade	Alt. C 1st Decade	Alt. C 5th Decade	Alt. D 1st Decade	Alt. D 5th Decade	Alt. E 1st Decade	Alt. E 5th Decade
Ackerman	2.48	2.53	2.48	2.53	2.67	2.48	2.77	2.48	2.58	2.48	2.48
Bienville	3.00	2.89	2.75	2.89	2.75	2.89	2.75	2.89	2.89	2.89	2.82
Chickasawhay	3.02	3.02	2.91	3.02	2.91	3.02	3.02	3.02	2.91	3.02	3.02
Delta	3.12	3.31	2.94	3.31	3.50	3.31	3.50	3.31	3.50	3.31	3.50
DeSoto	3.27	3.07	2.82	3.17	2.87	3.17	2.82	3.12	2.77	3.17	2.87
Holly Springs	2.72	2.72	2.72	2.72	2.91	2.72	2.86	2.77	2.72	2.77	2.67
Homochitto	3.04	3.08	2.81	3.08	2.96	2.96	2.77	2.96	2.69	2.92	2.77
Trace	2.48	2.53	2.48	2.53	2.67	2.48	2.77	2.48	2.58	2.48	2.48
Yalobusha	2.86	2.72	2.72	2.72	2.91	2.72	2.86	2.81	2.86	2.77	2.72

Figure H 46. Forest interior birds group current and estimated ecological sustainability evaluation scores by alternative and unit

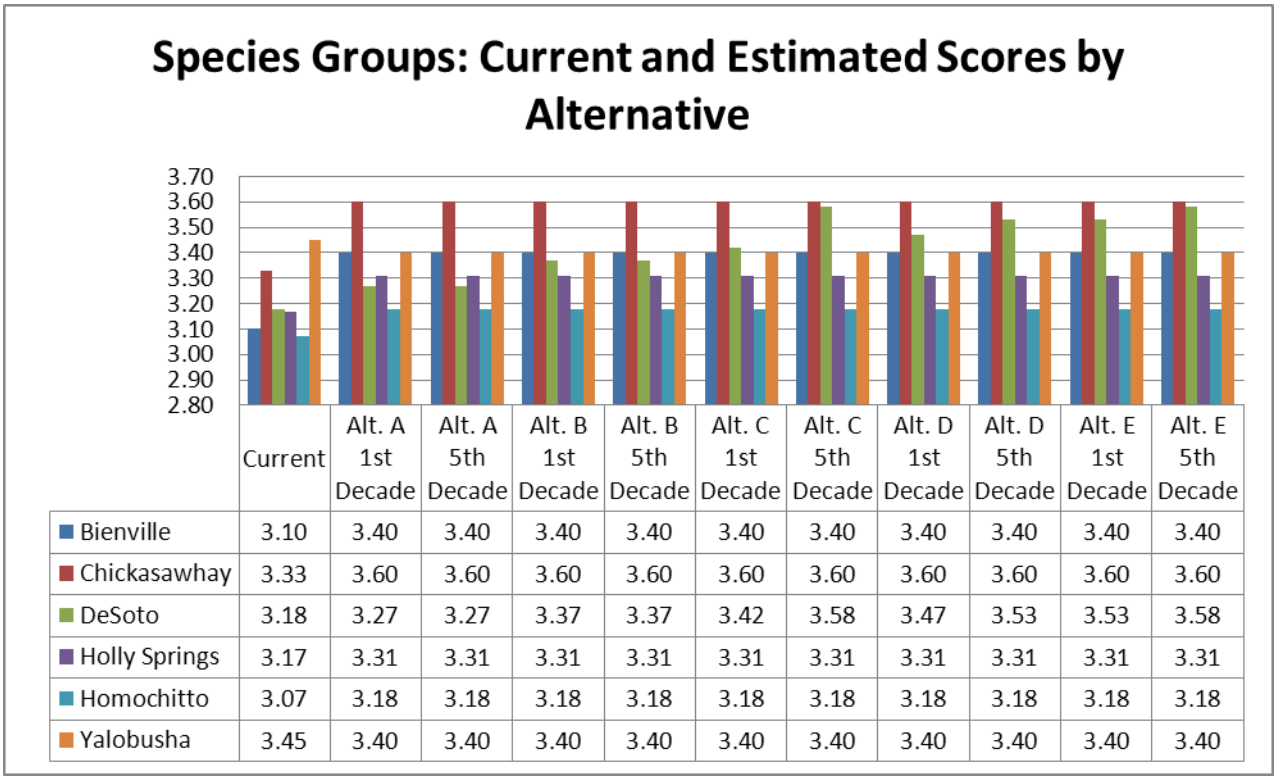
H.2.11 Species Dependent on Fire to Maintain Habitat



	Current	Alt. A 1st Decade	Alt. A 5th Decade	Alt. B 1st Decade	Alt. B 5th Decade	Alt. C 1st Decade	Alt. C 5th Decade	Alt. D 1st Decade	Alt. D 5th Decade	Alt. E 1st Decade	Alt. E 5th Decade
Ackerman	1.54	1.00	1.00	1.53	1.63	1.95	2.05	2.00	2.68	2.00	2.53
Bienville	1.91	2.28	2.34	2.45	2.59	2.79	2.79	2.86	2.86	3.10	3.10
Chickasawhay	2.61	2.05	2.14	2.14	2.24	2.71	2.81	2.76	2.86	2.76	2.86
DeSoto	2.37	2.45	2.45	2.58	2.64	2.82	3.18	2.91	3.15	3.15	3.39
Holly Springs	2.08	1.13	1.13	1.47	1.53	2.27	2.47	2.33	2.73	2.67	3.07
Homochitto	1.92	1.60	1.60	1.60	1.60	1.93	1.87	2.47	2.53	2.47	2.47
Trace	2.00	1.00	1.00	1.76	1.86	2.14	2.29	2.19	2.81	2.19	2.67
Yalobusha	2.00	1.13	1.13	1.47	1.53	2.27	2.33	2.33	2.73	2.67	3.07

Figure H 47. Species dependent on fire to maintain habitat current and estimated ecological sustainability evaluation scores by alternative and unit

H.2.12 Species Sensitive to Hydrologic Modification of Wetlands



	Current	Alt. A 1st Decade	Alt. A 5th Decade	Alt. B 1st Decade	Alt. B 5th Decade	Alt. C 1st Decade	Alt. C 5th Decade	Alt. D 1st Decade	Alt. D 5th Decade	Alt. E 1st Decade	Alt. E 5th Decade
Bienville	3.10	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40
Chickasawhay	3.33	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
DeSoto	3.18	3.27	3.27	3.37	3.37	3.42	3.58	3.47	3.53	3.53	3.58
Holly Springs	3.17	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31
Homochitto	3.07	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18
Yalobusha	3.45	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40

Figure H 48. Species sensitive to hydrologic modification of wetlands current and estimated ecological sustainability evaluation scores by alternative and unit

H.2.13 Calciphiles Associates

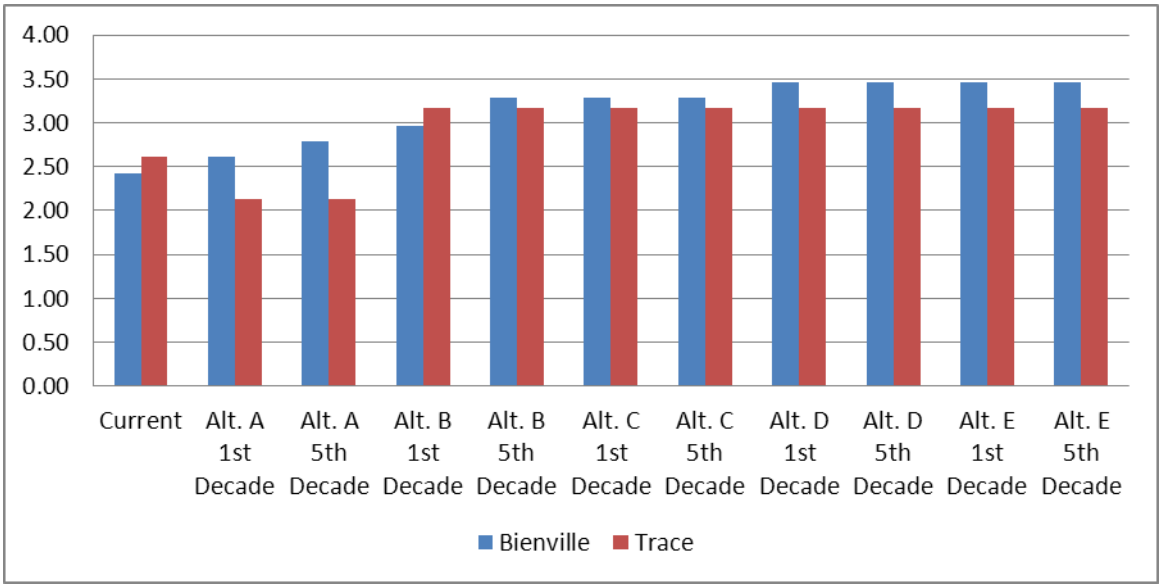
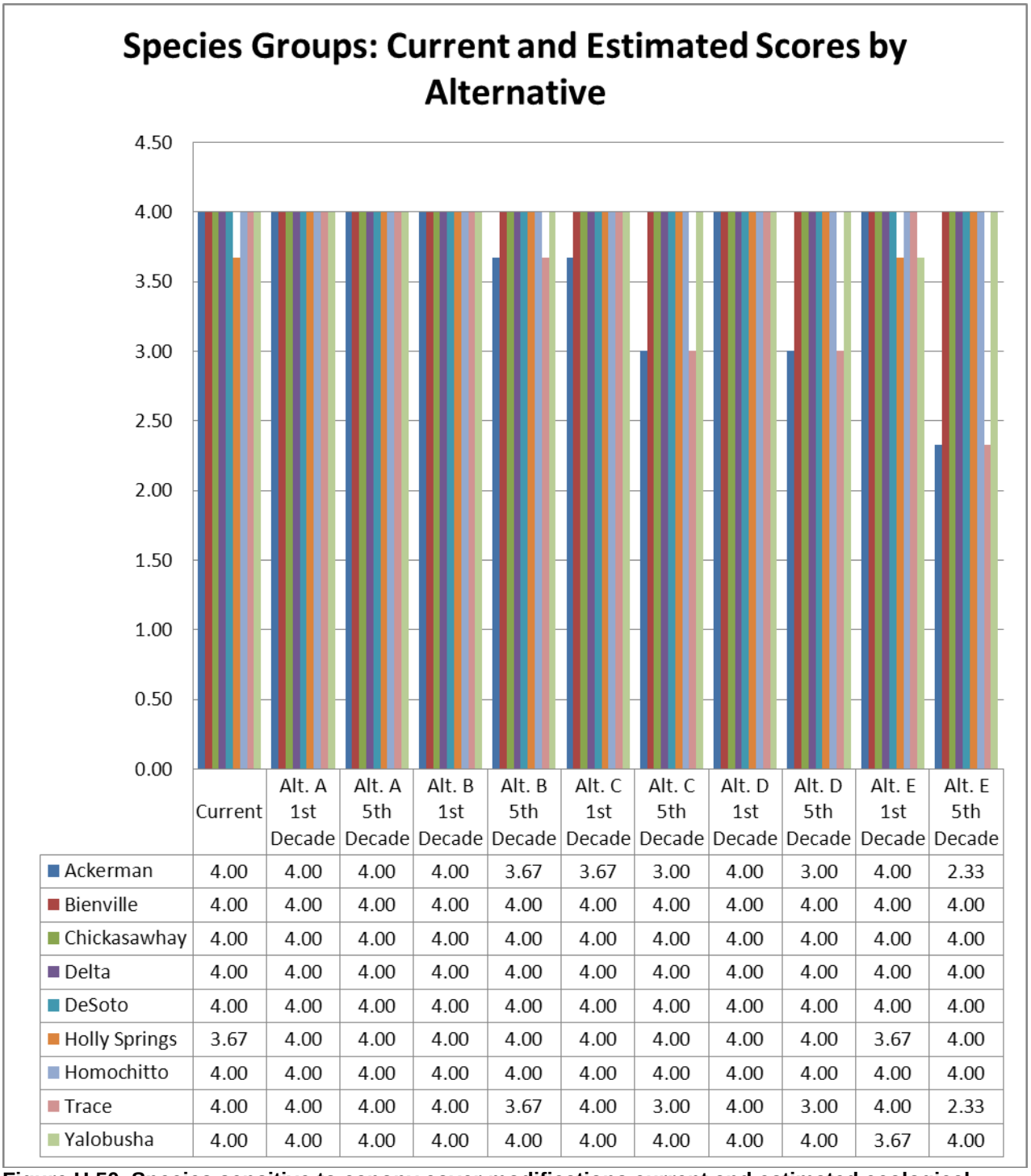


Figure H 49. Calciphiles associates current and estimated ecological sustainability evaluation scores by unit and alternative

Table H 22. Calciphiles associates ecological sustainability evaluation scores and rankings by unit and alternative

Unit		Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
	Current	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade	1st Decade	5th Decade
Bienville	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
	2.43	2.62	2.79	2.96	3.29	3.29	3.29	3.46	3.46	3.46	3.46
Trace	Good	Fair	Fair	Good	Good	Good	Good	Good	Good	Good	Good
	2.61	2.13	2.13	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17

H.2.14 Species Sensitive to Canopy Cover



	Current	Alt. A 1st Decade	Alt. A 5th Decade	Alt. B 1st Decade	Alt. B 5th Decade	Alt. C 1st Decade	Alt. C 5th Decade	Alt. D 1st Decade	Alt. D 5th Decade	Alt. E 1st Decade	Alt. E 5th Decade
Ackerman	4.00	4.00	4.00	4.00	3.67	3.67	3.00	4.00	3.00	4.00	2.33
Bienville	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Chickasawhay	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Delta	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
DeSoto	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Holly Springs	3.67	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.67	4.00
Homochitto	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Trace	4.00	4.00	4.00	4.00	3.67	4.00	3.00	4.00	3.00	4.00	2.33
Yalobusha	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.67	4.00

Figure H 50. Species sensitive to canopy cover modifications current and estimated ecological sustainability evaluation scores by unit and alternative